
***Supplemental RCRA Facility
Investigation (RFI)
Report No. 1***

Pontiac North Campus

General Motors Corporation
Pontiac, Michigan

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Acronyms

AOI	Area of interest
AST	Aboveground storage tank
BCa	Bias Corrected and accelerated
Bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylene
CCR	Current Conditions Report
CMP	Corrective Measures Proposal
COC	Constituents of Concern
CPC	Chevrolet-Pontiac-Canada Group
DA	Demolition Area
DNAPL	Dense non-aqueous phase liquid
DO	Dissolved Oxygen
DUSR	Data Usability Summary Reports
EEC	Encore Environmental Consortium, LLC
EI	Environmental indicator
ELPO	Electrodeposition
ENCORE	Environmental Corporate Remediation Co. Inc.
FSP	Field Sampling Plan
GM	General Motors Corporation
HI	Hazard Index
HQ	Hazard Quotient
IDC	Industrial Direct Contact Criteria
IDWC	Industrial Drinking Water Criteria
IPSIC	Industrial Particulate Soil Inhalation Criteria
LNAPL	Light non-aqueous phase liquid
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MFD	Metal Fabrication Division
NAPL	Non-aqueous phase liquid
NFA	No Further Action
NRC	National Response Center
NREPA	Natural Resources and Environmental Protection Act
NTU	Nephelometric units
ORP	Oxygen Reduction Potential
OSWER	Office of Solid Waste and Emergency Response
PA/VSI	Preliminary Assessment/Visual Site Inspection
PCB	Polychlorinated biphenyl
PID	Photoionization detector
PNC	Pontiac North Campus
PRC	PRC Environmental Management, Inc.
PRG	Preliminary Remediation Goal
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RDC	Residential Direct Contact Criteria
RDWC	Residential Drinking Water Criteria
RFI	RCRA Facility Investigation

SPO	Service Parts Operations
SQL	Sample Quantitation Limit
SVOC	Semi-volatile organic compounds
SWDF	Storm Water Detention Facility
SWHI	Site-Wide Hydrogeologic Investigation
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
TCL	Target Compound List
TEQ	Toxicity Equivalent
TSDF	Treatment, Storage, and Disposal Facilities
UCL	Upper Confidence Limit on the Mean
U.S. EPA	United States Environmental Protection Agency
UST	Underground storage tank
VSI	Visual Site Inspection
VOC	Volatile organic compounds
WWTP	Wastewater treatment plant

1. Introduction

1.1 General

On October 10, 2000, the United States Environmental Protection Agency (U.S. EPA) and General Motors Corporation (GM) entered into a Performance Based Corrective Action Agreement (The Agreement) for the Pontiac North Campus (PNC) located in Pontiac, Michigan (Site). The Agreement calls for GM to work independently and voluntarily to investigate and, as necessary, stabilize and remediate releases of hazardous waste or hazardous constituents at or from the Site in accordance with the Resource Conservation and Recovery Act (RCRA) and relevant U.S. EPA corrective action guidance. The RCRA Facilities Investigation (RFI) Report (Environmental Corporate Remediation Co. Inc. (ENCORE), 2002b) for the Site was prepared by Encore Environmental Consortium, L.L.C. (EEC) for ENCORE; a wholly owned subsidiary of GM, and submitted to the U.S. EPA in April 2002.

This Supplemental RFI Report No. 1 (Report) presents the results of additional RFI activities that were conducted at the Site following the preparation of the RFI Report (ENCORE, 2002b). In general, this Report presents the results of investigations completed pursuant to RFI Work Plan Addenda Nos. 4, 5, 6, 7, 8, 8A, and 9 (ENCORE, 2003a-g) plus other activities at the Site to address U.S. EPA comments on the RFI Report (ENCORE, 2002b) or provisions in The Agreement documents. These activities include additional groundwater sampling, pit and sump investigations, the investigation of three newly identified Areas of Interest (AOIs), additional investigations to address U.S. EPA comments on the CA750/CA725 determination, and free product delineation activities.

The Site encompasses approximately 595 acres in the northwest quadrant of the City of Pontiac, Michigan (Figure 1-1). The Site consists of four facilities (Figure 1-2), including:

- Chevrolet-Pontiac-Canada Group (CPC) Pontiac Fiero Assembly Plant (formerly GM Fisher Body Division); GMNA Property Management Fiero Facility; Baldwin Ave; Pontiac, Michigan 48340; (U.S. EPA ID No. MID 005356910);
- GM Central Foundry Division - Pontiac Plant; One Pontiac Plaza; Pontiac, Michigan 48340 (U.S. EPA ID No. MID 085470102);
- CPC – Pontiac; GM Metal Fabricating Division Pontiac; 220 E. Columbia Ave; Pontiac, Michigan 48340 (U.S. EPA ID No. MID 005356886); and
- GM Warehousing and Distribution Division; Service Parts Operations (SPO); 9251 Joslyn Rd; Pontiac, Michigan 48340 (U.S. EPA ID No. MID 076331289).

Because Site operations have changed significantly over time, the RFI grouped operations according to current activities. Figure 1-3 shows each of the Site operational areas while Figure 1-4 shows an overlay of the operational areas and the facility boundaries. The operational areas at the Site include:

- Fiero;
- Demolition Area (DA);
- Metal Fabrication Division (MFD);
- Powertrain; and
- Service Parts Operation (SPO).

A total of 64 AOIs were identified as part of the Current Conditions Report (CCR (ENCORE, 2001a)) of those 64 AOIs, 35 AOIs were determined to warrant investigation and were investigated during the initial RFI activities. The results of those investigations are summarized in the RFI Report (ENCORE, 2002b). Since the RFI Report (ENCORE, 2002b) was completed, three additional AOIs and one additional area (Storm Water Detention Facility (SWDF)) have been identified at the Site. Sixteen AOIs previously discussed in the RFI Report (ENCORE, 2002b), three recently identified AOIs, and the SWDF are discussed in this Report. Summaries of the investigative activities completed at each AOI are presented in Table 1-1. Figure 1-5 presents the location of all AOIs, while Figure 1-6 presents the location of the AOIs and other areas discussed in this Report.

1.2 Purpose

GM performed the RFI pursuant to The Agreement to determine whether the AOIs identified in the CCR (ENCORE, 2001a) as warranting Further Action have released hazardous waste or hazardous constituents that may pose an unacceptable risk to human health and the environment. The CCR (ENCORE, 2001a) and CCR Addendum No. 1 (ENCORE, 2002a) were prepared in part to provide details of historical and current operations at the Site, previous investigations and remedial activities, RCRA regulatory history, historical and current waste management practices, and specific areas targeted for investigation.

The RFI field investigations were conducted in accordance with an RFI Work Plan (ENCORE, 2001b) and RFI Work Plan Addenda Nos. 1-9 (ENCORE, 2001c-d, 2002c, 2003a – g). The RFI Report (ENCORE, 2002b) presented the results of the field investigations conducted between June 2001 and February 2002 according to the RFI Work Plan (ENCORE, 2001b), and Work Plan Addenda Nos. 1-3 (ENCORE, 2001c-d, 2002c).

The information in this Report describes the procedures, methods, and results of the field investigations conducted following preparation of the RFI Report (ENCORE, 2002b). The information includes a comparison of the analytical data with Michigan Part 201 generic cleanup criteria

(screening criteria) (Michigan Department of Environmental Quality (MDEQ), 2002) to identify whether a potential release of hazardous waste or hazardous constituents has occurred from each AOI where supplemental RFI field work was conducted. Where a potential release is identified, the nature and extent of hazardous constituents in the environmental media characterized during the supplemental RFI activities are discussed. A human health risk evaluation is included in this Report to provide a basis for evaluating whether the presence of these hazardous constituents pose an unacceptable risk to human health.

1.3 Supplemental RFI Objectives

The objectives of supplemental RFI activities were to complete investigations necessary to:

- Determine hydrogeologic conditions, as necessary, to properly investigate releases from the new AOIs;
- Characterize the nature and extent of potential releases of hazardous waste and/or hazardous constituents in environmental media at the new AOIs;
- Assess potential risk to human health and the environment associated with potential releases of hazardous waste and/or hazardous constituents at the new AOIs;
- Provide sufficient data to support the RCRA corrective action environmental indicators (EI) determination for the new AOIs;
- Determine whether interim corrective measures are necessary to control current unacceptable risks, if any, to human health at the new AOIs;
- Determine whether corrective measures are necessary to mitigate current and future unacceptable risks, if any, to human health and the environment for the new AOIs;
- Determine the impact, if any, from discharges from the new AOIs to off-Site areas;
- Determine the impact, if any, below several on-Site sumps and pits;
- Fulfill provisions for a second round of groundwater sampling, as described in the RFI Work Plan (ENCORE, 2001b);
- Provide further characterization of groundwater quality at existing AOIs based on U.S. EPA comments on the CA750/CA725 determination;
- Monitor Site-wide groundwater conditions by completing two semi-annual sampling events (November 2002 and May 2003); and
- Delineate free product plumes.

1.4 Report Organization

This Report is organized as follows:

- Section 2 provides an overview of the supplemental RFI activities conducted since preparation of the RFI Report (ENCORE, 2002b); including a summary of the various investigations;
- Section 3 provides an update to the geology, hydrogeology, and investigation procedures presented in the RFI Report (ENCORE, 2002b) and the RFI Work Plan (ENCORE, 2001b);
- Section 4 presents a summary and discussion of the supplemental RFI results for each of the AOIs and other areas investigated. The discussion for each area investigated includes a summary of the scope of the field investigation, a summary and evaluation of the supplemental RFI data, and a discussion of whether a potentially significant release above screening criteria has been identified;
- Section 5 presents a human health risk evaluation that evaluates the potential releases at areas identified in Section 4 to determine whether interim measures or corrective measures are warranted;
- Section 6 provides the summary and conclusions of this Report;
- Section 7 provides a list of references cited in this Report;
- Tables;
- Figures;
- Appendix A contains the complete analytical compound lists;
- Appendix B provides the soil boring logs and monitoring well construction diagrams;
- Appendix C contains the analytical data summaries;
- Appendix D contains the Data Usability Summary Reports (DUSR);
- Appendix E provides the LNAPL fingerprinting reports; and
- Appendix F presents the supporting risk calculations.

2. Supplemental Field Investigation Overview

The RFI Report (ENCORE, 2002b) presented the results of the RFI investigations conducted at the Site between June 2001 and February 2002. Supplemental RFI activities were conducted at existing and recently discovered AOIs between February 2002 and October 2003. This Section provides an overview of the investigations, summarizes the operational areas investigated and introduces three new light non-aqueous phase liquid (LNAPL) areas identified during the supplemental RFI activities performed between February 2002 and November 2003.

2.1 Investigation Overview

The supplemental RFI field investigations and results summarized in this Report include:

- Second round groundwater sampling;
- Pit and sump investigative activities;
- Soil sampling in a void below the floor in the Electrodeposition (ELPO) building;
- Investigation of the SWDF;
- Semi-annual groundwater sampling;
- Investigation of three newly identified AOIs associated with Former Plant 18 (RFI Work Plan Addenda Nos. 5, 6, and 7 (ENCORE, 2003b-d));
- Additional characterization activities to address the U.S. EPA comments related to the CA750/CA725 EI determination (RFI Work Plan Addendum No. 8 (ENCORE, 2003e));
- LNAPL delineation activities (RFI Work Plan Addenda Nos. 4, 8A, and 9 (ENCORE, 2003a,g,f));
- Delineation of potential subsurface impacts (RFI Work Plan Addendum No. 9 (ENCORE, 2003f)); and
- Data collection to support the evaluation of corrective measures options.

A summary of the field investigations performed and the associated AOIs is provided in Table 1-1.

2.1.1 Second Round Groundwater Sampling

The RFI Work Plan (ENCORE, 2001b) provided for the collection of two rounds of groundwater samples from each monitoring well installed as part of the RFI. At the time the RFI Report (ENCORE, 2002b) was prepared, the second round of groundwater samples for some monitoring wells had not been completed. This Report presents the second round groundwater sampling results for these monitoring wells.

2.1.2 Pit and Sump Investigations

Comments received from the U.S. EPA recommended that GM repair/rehabilitate as necessary sumps or pits that would remain active at the Site and properly abandon sumps or pits that will no longer be active. Several sumps and pits were investigated as part of the RFI. Before any of these pits or sumps were abandoned, a soil sample was collected from immediately beneath the pit or sump (after any tanks or machinery was removed) to support decommissioning of the pit or sump. The results of the soil samples collected from under the pits and sumps at AOIs M-9 and F-8 are summarized in this Report.

2.1.3 Soil Sample from Below ELPO Plant Floor

A 4-inch diameter hole in the concrete floor in the ELPO building was created when a concrete protective post was removed from the floor. A visual inspection of the subsurface conditions beneath the floor and the results of the soil sample are discussed in this Report.

2.1.4 Storm Water Detention Facility (SWDF)

During a routine cleaning and inspection of the SWDF completed during September and October 2002, cracks in the concrete floor were observed as well as missing or degraded Sections of rubber seals between the concrete slabs. On the basis of these observations, a subsurface investigation was completed to determine if any potentially impacted storm water from the storm water basin had infiltrated into the subsurface, and if so, the possible impacts to soil and/or groundwater.

2.1.5 Semi-Annual Groundwater Sampling

The RFI Report (ENCORE, 2002b), included a groundwater monitoring plan that provided for semi-annual sampling of certain monitoring wells. Since the RFI Report (ENCORE, 2002b) was prepared, two semi-annual sampling events have been conducted at the Site, November 2002 and May 2003. The analytical results for these sampling events are summarized in the November 2002 Semi-Annual Groundwater Monitoring Event Summary Report (ENCORE, 2003h) and the May 2003 Semi-Annual Groundwater Monitoring Event Summary Report (ENCORE, 2003i). The Risk Evaluation presented in this Report will evaluate the analytical data results from these sampling events. Table 2-1 lists the monitoring wells sampled during the two semi-annual sampling events.

2.1.6 New AOIs

Three AOIs were identified after preparation of the RFI Report (ENCORE, 2002b) in the vicinity of Former Plant 18. Field investigations were completed at each AOI to determine if a significant release exceeding applicable Part 201 criteria has occurred for each AOI. Soil was investigated at each AOI, while groundwater was encountered at only two of the three new AOIs.

The initial investigation approach for each AOI is described in the following work plans:

- RFI Work Plan Addendum No. 5, Pipeline Release Investigation – AOIP-9 (ENCORE, 2003b);
- RFI Work Plan Addendum No. 6, Former Plant 18 Investigation – AOIP-10 (ENCORE, 2003c); and
- RFI Work Plan Addendum No. 7, Trestle Pipeline Release Investigation – AOIP-11 (ENCORE, 2003d).

Additional investigative activities were completed at AOIP-9 that were not in provided for RFI Work Plan Addendum No. 5 (ENCORE, 2003b). These activities are discussed in Section 4.4.2.

2.1.7 Environmental Indicators (EIs) CA750/CA725 Determination

The EI Report (ENVIRON, 2002) addressed the following EI determinations:

- CA725: Current Human Exposures Under Control; and
- CA750: Migration of Contaminated Groundwater Under Control.

During implementation of the RFI field investigation, groundwater samples collected at several AOIs had concentrations that were higher than the conservative screening criteria used for identifying “contaminated” groundwater used in the RFI Report (ENCORE, 2002b). Risk-based evaluations of the groundwater quality data collected during the RFI using realistic scenarios of potential non-potable exposures to groundwater determined that there are no unacceptable exposures to groundwater at and around the Site. The U.S. EPA concurred with the determination that no significant exposures to groundwater exist at and around the Site, but requested additional groundwater characterization around select AOIs to provide a more precise boundary of areas where groundwater quality may be affected by a release (U.S. EPA, 2002b).

A meeting was held on February 26, 2003 between the U.S. EPA, ENCORE, and EEC. In this meeting, ENCORE agreed to evaluate and perform additional characterization of groundwater quality at the following AOIs to meet the intent of the CA750 EI determination:

-
- F-7 – Wastewater Collection Sumps at Fiero Powerhouse;
 - M-1 – Wastewater Treatment Plant (WWTP);
 - M-4 – Plant 25 Former Gasoline underground storage tank (UST) and Current Gasoline above-ground storage tank (AST);
 - M-5 – Former A-2 Fill Area;
 - M-16 – Plant 25 Basement Sump Area;
 - M-25 – Plant 33 Basement Sump Area; and
 - P-6 – Emissions Control Building Former UST Farm and Former Stoddard Solvent AST.

In addition, ENCORE agreed to complete additional soil delineation at AOIF-15 to support the CA725 EI soil determination. RFI Work Plan Addendum No. 8 (ENCORE, 2003e) was prepared to address the additional characterization to meet the intent of the CA750/CA725 determination.

2.1.8 LNAPL Delineation Activities

Three new LNAPL areas (LNAPL Areas Nos. 4, 5, and 6) were identified and investigated during the supplemental RFI activities.

During the collection of groundwater levels at the Site in August 2002, LNAPL was detected in two monitoring wells at AOI M-2. RFI Work Plan Addendum No. 4 (ENCORE, 2003a) was prepared to direct the additional subsurface investigation to delineate the LNAPL. This LNAPL area is identified as LNAPL Area No. 4.

During installation of monitoring wells at AOIM-4 and AOIM-16, LNAPL was also encountered. RFI Work Plan Addendum No. 8A (ENCORE, 2003g) describes the initial delineation activities. This LNAPL area is identified as LNAPL Area No. 5.

During follow up activities to a geotechnical borehole investigation in the DA, which was completed as part of an industrial redevelopment proposal, stained soils and potential free product was observed in the soil. RFI Work Plan Addendum No. 9 (ENCORE, 2003f) describes the initial investigation to determine if LNAPL exists. This LNAPL area is identified as LNAPL Area No. 6.

2.1.9 Subsurface Impact Delineation

Potential subsurface impacts were observed during the implementation of a geotechnical borehole investigation, which was completed as part of an industrial redevelopment proposal that was prepared by GM. The geotechnical investigation consisted of the completion of 36 soil borings that were located within the vicinity of the footprint of the proposed industrial redevelopment area.

During the geotechnical investigation, odors, stained soil, and/or elevated photoionization detector (PID) readings were observed in 16 of the 36 soil borings. RFI Work Plan Addendum No. 9 (ENCORE, 2003f) was prepared to further investigate these 16 soil borings.

2.1.10 Remedial Options Evaluation

Additional wells (monitoring and recovery) and soil borings were installed in LNAPL Area No. 3 to evaluate groundwater and LNAPL levels and properties for evaluating and determining corrective measures. Proposed corrective measures are presented in the Corrective Measures Proposal (CMP) (ENCORE, 2003j). Any samples (soil or groundwater) collected during or following the installation of these new wells are discussed in Section 4.2.2 of this Report.

Groundwater samples were collected at AOIM-4 and AOIP-6 to evaluate groundwater treatment techniques at each of these areas. The groundwater analytical results from these AOIs are discussed in Section 4.3.3 and 4.4.1 of this Report. The remedial options are presented in the CMP (ENCORE, 2003j).

2.2 Operational Areas

Supplemental RFI activities were completed at four of the five operational areas at the Site. Further Action AOIs in the SPO operational area were not identified in the CCR (ENCORE, 2001a) or the RFI Report (ENCORE, 2002b), therefore the SPO operational area will not be discussed further in this Report. The SWDF is also discussed in this Report but does not fall within any of the Site operational areas. The following subsections present a brief summary of the four operational areas and the AOIs within each operational area investigated during supplemental RFI activities.

2.2.1 Fiero

The Fiero operational area consists of approximately 81 acres located at the southwestern portion of the Site (Figure 1-3) and includes Plant 17. Currently, this area is used for prototyping, storage, and other non-production purposes. Current and historical wastes generated from car assembly operations at Fiero may have included scrap metal and metalworking fluids and oils (petroleum-based, oil-water emulsions, or synthetic emulsions), paints, paint solvents, and plasticizers. A WWTP was in operation at Fiero from 1973 to 1983 and managed wastewater, wastewater treatment sludge, paint sludge, and bonderite sludge. This WWTP operated until 1983. The area was paved over as a driveway.

The Fiero AOIs investigated during the supplemental RFI activities include:

- AOI F-7: Wastewater Collection Sumps
 - CA750 determination - RFI Work Plan Addendum No. 8 (ENCORE, 2003e)
 - Pit and sump investigation
- AOI F-8: Paint Sludge Storage Area Form
 - Pit and sump investigation
- AOI F-15: Oil/Solvent Catch Basin
 - CA725 determination - RFI Work Plan Addendum No. 8 (ENCORE, 2003e)

2.2.2 Demolition Area (DA)

The DA consists of approximately 48 acres of the south-central portion of the Site. There are currently no buildings or operations within the DA portion of the Site. A large portion of the DA is involved in an industrial redevelopment proposal. Since 1996, the DA has been the subject of ongoing soil and groundwater investigations. The former Plant locations are shown on Figure 1-3.

The DA AOIs investigated during the supplemental RFI activities include:

- AOI W-1: West Yard
 - Second round groundwater sampling
 - Subsurface impact delineation - RFI Work Plan Addendum No. 9 (ENCORE, 2003f)
- AOI W-8: Former Plant 9 Basement AST Area
 - Second round groundwater sampling
 - Remedial options evaluation
 - Subsurface impact delineation - RFI Work Plan Addendum No. 9 (ENCORE, 2003f)
- AOI W-9: Former Central Foundry (Plant 6) Resin Spill and UST
 - Subsurface impact delineation - RFI Work Plan Addendum No. 9 (ENCORE, 2003f)
- AOI W-10: Railroad Marshalling Area Drainage System
 - Second round groundwater sampling

having at least one concentration higher than the most conservative screening criteria in any media at any AOI. These constituents are the constituents of concern (COC) for the Site.

Since the issuance of the RFI Report (ENCORE, 2002b), the Part 201 criteria have been amended (December 21, 2002). Table 4-1 presents a listing of the Part 201 amended 2002 criteria for the Site-specific COCs. All data collected following the preparation of the RFI Report (ENCORE, 2002b) presented in this Report is evaluated against the amended 2002 screening criteria.

Figures 4-1 through 4-5 provide a summary of all sample locations within each operational area.

4.1 Fiero

This Section summarizes the investigations and results completed at three Fiero AOIs during the supplemental RFI activities.

4.1.1 Wastewater Collection Sumps (AOI F-7)

AOI F-7 consists of a series of six wastewater collection sumps located in the Powerhouse, south of Plant 17 (Figure 1-5). These sumps were identified as Solid Waste Management Unit (SWMU) 7 in the Fiero Preliminary Assessment / Visual Site Inspection (PA/VS) Report (PRC Environmental Management (PRC), 1992); therefore, the sumps are considered an AOI.

There have been no known releases from the wastewater collection sumps. The Fiero PA/VS Report (PRC, 1992) stated that during the VSI the condition of the sumps was good. However, during the walkthrough completed as part of the preparation of the CCR (ENCORE, 2001a), these sumps were noted to be full of liquids and could not be inspected.

As part of the RFI activities the sumps were cleaned and inspected in June 2001. of the six sumps, two were associated with alkali-oily activities. Upon inspection, both of these sumps were observed to have cracked and broken sections of concrete. The remaining four sumps are associated with lime, fly-ash, and neutralization processes and therefore were not considered for subsequent investigation. These sumps were inspected and showed signs of pitting. Two monitoring wells were installed from which soil and groundwater samples were collected during the initial RFI activities. Soil and groundwater samples were submitted for laboratory analysis for VOCs, SVOCs, PCBs, and inorganics.

The Site personnel determined that the two sumps associated with the alkali-oily activities will be repaired and will remain in active use. As discussed in Section 2.1.2, the U.S. EPA requested that

sumps that will remain active be repaired/rehabilitated. Repairs to the sumps were completed on August 22, 2002, and included pressure washing the sump and coating the sides with polyurethane.

4.1.1.1 Scope and Results

The scope of the supplemental field investigations at AOIF-7 involved cleaning and repairing the two alkali-oily sumps and collection of soil and groundwater samples to support the CA750 determination (RFI Work Plan Addendum No. 8 (ENCORE, 2003e)).

The following is a summary of the supplemental sampling activities conducted for each medium at AOIF-7. Samples were collected in accordance with the procedures discussed in Section 2.4, except as otherwise noted. A summary of field investigations performed is presented in Table 1-1.

Soil Samples

One soil boring associated with the installation of a monitoring well (MWF7-03) proposed in the RFI Work Plan Addendum No. 8 (ENCORE, 2003e) was completed at AOIF-7. Soil samples were collected from the 7 to 9 feet and 11 to 13 feet bgs intervals due to elevated PID readings. The samples were submitted for analysis of VOCs, SVOCs, PCBs and inorganics. Soil boring and monitoring well locations are shown on Figure 4-6. Soil boring logs and well construction diagrams are provided in Appendix B.

Groundwater Samples

One round of groundwater samples was collected from three monitoring wells (MWF7-01 through MWF7-03) at AOIF-7. Monitoring well MWF7-03 was installed upgradient from MWF7-02 as proposed in the RFI Work Plan Addendum No. 8 (ENCORE, 2003e). Monitoring well locations are shown on Figure 4-7. The samples were submitted for laboratory analysis for 1,1-dichloroethene and tetrachloroethene.

The number of locations from which supplemental RFI samples were collected for each medium and the number of samples analyzed for each analyte group are as follows:

Medium	Locations	VOCs	SVOCs	PCBs	Inorganics
Soil	1	2	2	2	2
Groundwater	3	3*	0	0	0

*1,1-Dichloroethene and tetrachloroethene only

Summaries of the analytical data for all AOIF-7 soil and groundwater samples collected during the RFI are shown in Tables 4-2 and 4-3, respectively. The analytical data for the supplemental RFI samples are provided in Appendix C. Complete documentation of the data review and validation of the supplemental RFI samples are provided in Appendix D.

4.1.1.2 Discussion of Results

The concentrations of constituents detected in soil and groundwater were compared with the screening criteria as discussed in Section 4.0.

Soil Samples

The concentrations of constituents detected in the soil boring samples collected from AOIF-7 during the supplemental RFI activities do not exceed the soil screening criteria. Figure 4-6 provides a summary of sample locations and analytical results for soil. As discussed in the RFI Report (ENCORE, 2002b), the chromium (total) concentration from a sample at 8 to 10 feet bgs was the only concentration that exceeds the soil screening criteria at this AOI.

Groundwater Samples

The concentrations of 1,1-dichloroethene and tetrachloroethene in groundwater samples collected from AOIF-7 during the supplemental RFI activities exceed the groundwater screening criteria.

The concentration of 1,1-dichloroethene at MWF7-02 (0.013 mg/L) exceeds the IDWC and Residential Drinking Water Criteria (RDWC) of 0.007 mg/L and the tetrachloroethene concentration at MWF7-02 (0.0062 mg/L) exceeds the IDWC and RDWC of 0.005 mg/L. Previous RFI monitoring data also showed that these two constituents have concentrations that are higher than the screening criteria (ENCORE, 2002b).

Monitoring well MWF7-03 was installed to provide an appropriate upgradient well to bound the contaminant plume at AOIF-7 to support the CA750 determination. Since no constituents were detected in groundwater at concentrations higher than the screening criteria, monitoring well MWF7-03 serves as an appropriate upgradient groundwater boundary for AOIF-7.

Figure 4-7 provides a summary of sample locations and analytical results for groundwater.

4.1.1.3 Conclusions

Cleaning and repairs to the alkali-oily sumps were completed in August 2002. The activities associated with the sump repairs included pressure-washing the sump and coating the sides with polyurethane.

The supplemental RFI soil data from AOIF-7 did not identify conditions that are materially different from those described in the RFI Report (ENCORE, 2002b).

The supplemental RFI groundwater data from AOIF-7 indicates that a release has occurred to groundwater at AOIF-7. Consistent with the findings reported in the RFI Report (ENCORE, 2002b), 1,1-dichloroethene and tetrachloroethene concentrations were found to exceed the IDWC and RDWC. Based on the groundwater results, AOIF-7 is further discussed in the Risk Evaluation presented in Section 5. Groundwater analytical results for MWM7-03 provide an appropriate upgradient boundary for 1,1-dichloroethene and tetrachloroethene concentrations in groundwater at AOIF-7 to support the CA750 determination.

Table 1-1 presents a summary of the data, conclusions, and proposed activity for this AOI.

4.1.2 Former Paint Sludge Storage Area (AOIF-8)

AOIF-8 consists of a former paint sludge and storage area located north of the paint and mixing building (Figure 1-5). The area previously managed solid wastes and was also identified as SWMU 8 in the Fiero PA/VS Report (PRC, 1992); therefore, the area is considered an AOI.

As part of the RFI activities, the former paint sludge storage area, currently used as a salt pad for storing road salt, was cleaned and inspected in July 2001. The salt pad appeared to be intact with some minor cracking. The salt pad is surrounded by a concrete trench system that leads to a sump, which is located on the south side of the pad. The sump was black-stained at the bottom and had a 4-inch pipe on the south side. The concrete sump did not appear to have been a solid pour, thus resulting in poor contact between pours. Several cracks were observed in the concrete pad, some of which had openings of up to two millimeters. One monitoring well was installed, from which soil samples and groundwater samples were collected during the original RFI. Soil and groundwater samples were submitted for laboratory analysis for VOCs, SVOCs, PCBs, and inorganics.

4.1.2.1 Scope and Results

The scope of the supplemental field investigations at AOIF-8 involved collection of a soil sample from beneath the sump to support decommissioning the sump as discussed in Section 2.1.2.

The following is a summary of the supplemental RFI soil sampling activities conducted at AOIF-8. Samples were collected in accordance with the procedures discussed in Section 2.4, except as otherwise noted. A summary of field investigations performed is presented in Table 1-1.

Soil Sample

The subsurface investigation in AOIF-8 included collecting a soil sample (SF8-01) from directly below the middle of the sump. Approximately three inches of concrete was cored and the soil sample was collected from the two-foot interval directly below the concrete using a hand auger. The location of the soil boring is shown on Figure 4-6. The sample was submitted for laboratory analysis for VOCs, SVOCs, PCBs, and inorganics.

The number of locations from which supplemental RFI soil samples were collected and the number of samples analyzed for each analyte group is as follows:

Medium	Locations	VOCs	SVOCs	PCBs	Inorganics
Soil	1	1	1	1	1

A summary of the analytical data for all AOIF-8 soil samples collected during the RFI is shown in Table 4-4. The analytical data for the supplemental RFI samples is provided in Appendix C. Complete documentation of the data review and validation of the supplemental RFI samples area provided in Appendix D.

4.1.2.2 Discussion of Results

The concentration of constituents detected in the soil sample was compared with the screening criteria as discussed in Section 4.0.

Soil Sample

The concentrations of constituents detected in the soil sample collected from under the sump at AOIF-8 during the supplemental RFI activities did not exceed the screening criteria. Figure 4-6 provides a summary of the sample location and analytical results. Also, no concentration in any of the soil samples collected during previous RFI activities is higher than screening criteria (ENCORE, 2002b).

4.1.2.3 Conclusions

The supplemental RFI soil data from AOIF-8 does not indicate that a release has occurred at AOIF-8, confirming the conclusions of the RFI Report (ENCORE, 2002b). Concentrations detected in soil do not exceed screening criteria. No further action (NFA) or investigation is warranted for this area.

Table 1-1 presents a summary of the data and conclusions for this AOI.

4.1.3 Oil/Solvent Catch Basin (AOIF-15)

AOIF-15 is a catch basin that is located in the south loading dock at Fiero Plant 17 (Figure 1-5). Petroleum-like odors were reported emanating from the catch basin. The oil/solvent catch basin was cleaned and inspected during the original RFI activities. Materials within the catch basin included oil and sludge that contained chlorinated solvents. The catch basin showed evidence of pitting and cracking and was stained throughout. Two soil borings and one monitoring well were installed, from which soil samples and groundwater samples were collected during the original RFI. Soil and groundwater samples were submitted for laboratory analysis for select analytes, which included VOCs, SVOCs, PCBs, and inorganics.

4.1.3.1 Scope and Results

The scope of the supplemental field investigations at AOIF-15 involved collection of soil samples to determine if VOCs from the oil/solvent catch basin impacted soils to the north, east, and west of the catch basin as requested by the U.S. EPA as part of the CA725 determination (RFI Work Plan Addendum No. 8 (ENCORE, 2003e)).

The following is a summary of the supplemental RFI soil sampling activities completed at AOIF-15. Samples were collected in accordance with the procedures discussed in Section 2.4, except as otherwise noted. A summary of field investigations performed is presented in Table 1-1.

Soil Samples

Three soil borings (BF15-03 through BF15-05) were completed at AOIF-15 as proposed in RFI Work Plan Addendum No. 8 (ENCORE, 2003e). Soil boring locations are shown on Figure 4-6. An additional sample was collected due to an elevated PID reading from BF15-05 (12 to 13 feet bgs). The samples were submitted for laboratory analysis for VOCs. Soil boring logs are provided in Appendix B.

The number of locations from which supplemental RFI soil samples were collected and the number of samples analyzed for each analyte group is as follows:

Medium	Locations	VOCs
Soil	3	10

Summaries of the analytical data for all AOIF-15 soil samples collected during the RFI are shown in Table 4-5. The analytical data for the supplemental RFI samples are provided in Appendix C. Complete documentation of the data review and validation of the supplemental RFI samples are provided in Appendix D.

4.1.3.2 Discussion of Results

The concentrations of constituents detected in the soil boring samples were compared with the screening criteria as discussed in Section 4.0.

Soil Samples

The concentrations of constituents detected in the soil boring samples collected from AOI F-15 during the supplemental RFI activities do not exceed the screening criteria. Figure 4-6 provides a summary of sample locations and analytical results for soil. As discussed in the RFI Report (ENCORE, 2002b), tetrachloroethene and 1,1-dichloroethene were detected at concentrations in soil exceeding screening criteria.

4.1.3.3 Conclusions

The supplemental RFI soil data from AOI F-15 confirm that the soil samples collected during the original RFI activities have adequately characterized the extent of affected soil at AOI F-15. The additional soil borings delineate VOC impacted soils at AOI F-15 to the north, east and west of the catch basin, satisfying the intent of the CA725 determination. Based on the RFI soil results, AOI F-15 is further discussed in the Risk Evaluation presented in Section 5.

Table 1-1 presents a summary of the data and conclusions for this AOI.

4.2 Demolition Area (DA)

This Section summarizes the investigations and results completed at four DA AOIs during the supplemental RFI activities.

4.2.1 West Yard (AOI W-1)

AOI W-1 consists of the West Yard, an area of approximately 20 acres located in the southwest corner of the DA (Figure 1-5). LNAPL Area No. 1 is located in AOI W-1. During the original RFI investigation activities, 11 soil borings were completed and 11 monitoring wells were installed. Soil, groundwater, and LNAPL samples were submitted for laboratory analysis for select analytes, which included VOCs, SVOCs, PCBs, inorganics, hexavalent chromium and/or dioxins.

5. Human Health Risk Evaluation

Section 4 discussed the results of the RFI field investigations for the AOIs where supplemental RFI field work was completed after preparation of the RFI Report (ENCORE, 2002b). It also compared all RFI soil and groundwater data collected at these AOIs with screening criteria, as defined in Section 4.0 to identify whether a potentially significant release of hazardous constituents has occurred. The environmental media that have been identified to have been affected by potentially significant releases and the primary constituents affecting each medium are summarized in Section 5.1. The potential for exposure to these media are discussed in Section 5.2 and the significance of these potential exposures is evaluated in Section 5.3. The results of the evaluation are summarized in Section 5.4.

5.1 Potentially Significant Releases

As discussed in Section 4.0, a potentially significant release at the AOIs where supplemental RFI field work was completed is identified based on comparison of the RFI characterization data for soil and groundwater with screening criteria. The results of the comparisons discussed in Section 4 are summarized for soil and groundwater in Sections 5.1.1 and 5.1.2, respectively.

5.1.1 Soil

The tables for Section 4 summarized the soil characterization data for each AOI, as well as the ratios of the highest measured concentrations for each constituent at each AOI to the screening criteria. As discussed in Section 4.0, the screening criteria for soil are the MDEQ Part 201 generic cleanup criteria for industrial sites that are based on direct contact, inhalation of soil vapor and particulates in ambient air, and inhalation of soil vapor in indoor air (MDEQ, 2002). The industrial Part 201 criteria were derived by the MDEQ based on a cancer risk of 10^{-5} and a HQ of 1.

A potentially significant release to soil at an AOI is identified in the Section 4 tables by comparing the highest Site-related concentration of each chemical in surface and subsurface soil at the AOI to the screening criteria. As a conservative assumption, all concentrations of organic chemicals are assumed to be Site-related. For inorganic chemicals, Site-related concentrations are considered those that are higher than the Site-specific background levels shown in the Section 4 soil tables, which were summarized and discussed in Table 3-4 and in Section 3.9 of the RFI Report (ENCORE, 2002b), respectively. Ratios of the highest Site-related concentrations in surface or subsurface soil to the screening criteria that exceed 1 are considered indications of a potentially significant release to soil. As shown in the Section 4 tables, the ratios for certain constituents exceed 1 at the following AOIs where supplemental RFI field work was completed:

-
- AOI F-7 (Wastewater Collection Sumps at Fiero Powerhouse)
 - AOI F-15 (Oil/Solvent Catch Basin)
 - AOI M-2 (Former Plating Operations Area)
 - AOI P-9 (Pipeline Release Investigation)
 - AOI P-11 (Trestle Pipeline Release Investigation)
 - AOI W-1 (West Yard)
 - AOI W-8 (Former Plant 9 Basement AST Area)
 - AOI W-9 (Former Central Foundry Resin Spill and UST)

This list of AOIs does not include AOIs where supplemental RFI field work was not necessary.

As noted in Section 4.2.5 of this Report, proposed industrial redevelopment is expected to be initiated at the Site where AOIs W-1, W-8, and W-9 are located. To evaluate potential exposures of workers to constituents in soil under this Site redevelopment scenario, the soil samples within the planned extent of the proposed industrial redevelopment were grouped and evaluated as a single area called "Area of Industrial Redevelopment". As shown on Table 4-14, certain locations in the Area of Industrial Redevelopment have potentially significant releases to soil.

Among the AOIs listed above, only AOIs F-15 and M-2 have constituents with concentrations that are higher than the screening criteria based on inhalation of soil vapor in indoor air (i.e., 1,1-dichloroethene and tetrachloroethene at AOIF-15, and 1,1-dichloroethene at AOIM-2). These constituents and concentrations are the same as those evaluated in the RFI Report (ENCORE, 2002b) and found to present no unacceptable exposure. Since these data were previously discussed in Section 5 of the RFI Report (ENCORE, 2002b), the discussion is not repeated in this Report. No constituents in soil at the Area of Industrial Redevelopment have concentrations that exceed the criteria based on vapor intrusion.

In addition to the soil characterization data summarized in the Section 4 tables, chemical characterization data for LNAPL was collected during the supplemental RFI field work at AOIs M-2 and M-16, as discussed in Sections 4.3.2 and 4.3.7, respectively. The chemical characterization data for the LNAPL at each of these AOIs are summarized in Tables 4-18 and 4-26, respectively. Although soil sampling completed during the RFI did not specifically target the depth interval in which the LNAPL layer fluctuates with the water table (the smear zone), a theoretical upper bound on the concentration of a LNAPL constituent in the smear zone soil (C_{soil}) can be estimated as follows:

$$C_{soil} = C_{NAPL} \cdot r_{NAPL} \cdot \frac{n}{r_{soil}}$$

where C_{NAPL} is the concentration of a chemical in the LNAPL, ρ_{NAPL} is the density of the LNAPL (approximately 0.9 kg/L), n is the total porosity of the soil (assumed to be 0.43), and ρ_{soil} is the dry bulk density of the soil (assumed to be 1.5 kg/L). The assumed soil porosity and bulk density are the default values U.S. EPA recommended in the Soil Screening Guidance (U.S. EPA, 1996). This calculation assumes 100% non-aqueous phase liquid (NAPL) saturation of the soil voids and is highly conservative since typical NAPL residual saturation does not exceed 20% to 50%, depending on the type of NAPL and soil.

The upper-bound smear zone soil concentrations estimated using the highest concentrations detected in the LNAPL at each AOI are shown in Table 5-1, and are compared with the soil screening criteria discussed above. As shown in Table 5-1, two constituents have upper-bound smear zone soil concentrations that exceed the screening criteria (1,1-dichloroethene and PCBs at AOI M-2, and PCBs at AOI M-16).

The potential for human exposure to the constituents in soil and LNAPL-containing soil with concentrations higher than the screening criteria is discussed in Section 5.2 and the significance of any potential exposure is discussed in Section 5.4. Section 5.4 also includes discussion of potential exposures of workers to the LNAPLs at AOIs M-2 and M-16 during subsurface construction activities that the soil screening criteria do not address (e.g., dermal contact with LNAPL) and hypothetical exposure of routine workers to vapors that are assumed to migrate from the LNAPL into indoor air.

5.1.2 Groundwater

Groundwater quality data were collected from four saturated zones during the RFI and the supplemental RFI field investigations, as discussed in the RFI Report (ENCORE, 2002b). Data from monitoring wells screened in the shallow unconfined water table zone are summarized in Table 5-2a, and data from monitoring wells screened in the intermediate zone (glaciolacustrine deposits) and in the deep zones (upper and lower sand and gravel outwash deposits) are summarized in Table 5-2b. Where appropriate based on the locations of the monitoring wells, the groundwater data on these Tables are grouped and summarized by AOI or area. Data from monitoring wells not specifically associated with a particular AOI (or area) are summarized as a group under "Site-wide hydrogeologic investigation" (SWHI). The locations of the monitoring wells are shown on Figures 4-1 through 4-5.

Tables 5-2a and 5-2b show the detected constituents, their detection frequencies and range of detected concentrations, and the ratios of the highest measured concentrations to the screening criteria. The screening criteria for groundwater are the MDEQ Part 201 generic cleanup criteria. The specific Part 201 criteria used here for identifying a potentially significant release for all four saturated

zones are those based on residential drinking water use (MDEQ, 2002), although these saturated zones are not a current or reasonably expected future drinking water source for the Site or the immediate vicinity. It should be noted that a deed restriction to prevent installation of water supply wells in the shallow unconfined water table zone at the Site may be established as part of the corrective measures proposed for the Site. In addition, the Part 201 criteria based on inhalation of groundwater vapor in indoor air and the criteria based on direct contact by workers conducting excavations (MDEQ, 2002) are also used to identify potentially significant releases in the unconfined saturated zone, which is as shallow as 10 ft bgs at some locations.

A potentially significant release to groundwater is identified in Tables 5-2a and 5-2b by comparing the highest concentration of each chemical in groundwater at an area to the screening criteria. The ratios of the highest concentrations to each set of screening criteria are shown in Tables 5-2a and 5-2b. Ratios higher than 1 are considered indications of a potentially significant release to groundwater.

As shown in Table 5-2a, organic chemicals with concentrations higher than the screening criteria in the shallow groundwater consist primarily of the VOCs: benzene, 1,1-dichloroethene, and vinyl chloride. Each of these VOCs is found at concentrations higher than the screening criteria at only one to three AOIs. No VOC has a concentration higher than the criteria based on inhalation of vapors in indoor air or the criteria based on direct contact by excavation workers.

Table 5-2a also shows that the following organic constituents were detected at concentrations that are higher than the screening criteria: bis(2-ethylhexyl)phthalate, 2,4-dimethylphenol, methylphenol (total), pentachlorophenol, PCBs, and 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) toxicity equivalent (TEQ). These organic constituents have a very small number of concentrations that are higher than the screening criteria. Only two concentrations of bis(2-ethylhexyl)phthalate (at AOIs M-2 and W-10), two concentrations 2,4-dimethylphenol (at AOIs P-9 and W-8), three concentrations of methylphenol (total) (at AOIs P-9 and W-8), and one concentration of pentachlorophenol (at AOIP-9) among 204 to 205 samples of shallow groundwater across the Site are higher than the screening criteria.

The presence of PCBs and 2,3,7,8-TCDD TEQ in groundwater at concentrations higher than the screening criteria is likely related to the presence of these chemicals in LNAPLs on the water table at AOIs W-1 and W-8. These constituents and concentrations are the same as those evaluated in Section 5.3.1 of the RFI Report (ENCORE, 2002b) and found to present no unacceptable exposure. Because these data were previously discussed in the RFI Report (ENCORE, 2002b), the discussion is not repeated in this Report.

Several metals are also present in the shallow groundwater at concentrations higher than the screening criteria, as shown in Table 5-2a. The most prevalent of these are manganese,

thallium, and vanadium. As discussed in Section 3 of the RFI Report (ENCORE, 2002b), the only thallium concentrations higher than the screening criteria were those that were obtained by Method 6010B, which was the method originally specified in the RFI Work Plan (ENCORE, 2001b). Based on a review of the thallium results from the initial phase of field work, U.S. EPA and GM determined that Method 6010B has a high potential for false detection of thallium at low concentrations in aqueous matrices (groundwater and surface water), and identified Method 6020 as a more appropriate method. All thallium analyses in subsequent phases of field work were done using Method 6020. The thallium concentrations obtained by Method 6020 do not exceed the screening criteria.

The groundwater data from the intermediate saturated zones have only four chemicals with concentrations higher than the screening criteria discussed above (acetone, bis(2-ethylhexyl)phthalate, lead, and thallium), as shown in Table 5-2a. Except for acetone, these chemicals have concentrations higher than the screening criteria in only one monitoring well in the intermediate saturated zone, and are unlikely to be associated with a release. Specifically, bis(2-ethylhexyl)phthalate and lead were detected at concentrations of 0.0088 mg/L and 0.0135 mg/L, respectively, at monitoring well IDW7 in January of 2002. Subsequent sampling and analysis during the semi-annual groundwater sampling events (November 2002 and May 2003) showed bis(2-ethylhexyl)phthalate and lead to be non-detect or below the screening criteria at IDW7. Based on recent groundwater results from this well and the frequency of detection, the concentrations of bis(2-ethylhexyl)phthalate and lead in well IDW7 are unlikely to be the result of a release.

In the deep saturated zones, the only chemicals with concentrations higher than a screening criterion are acetone and methylene chloride. The presence of acetone in the groundwater samples appears to be unrelated to a release at any AOI. As discussed in Section 4 of the RFI Report (ENCORE, 2002b), the presence of acetone in the groundwater samples is likely associated with well construction materials (coated bentonite pellets). Subsequent sampling and analysis during the most recent semi-annual groundwater sampling event (May 2003) showed acetone to be non-detect at GWP6 and GWD8, the two locations where acetone had previously exceeded the screening criteria. Therefore, the presence of acetone at these locations during previous sampling is not associated with a release from an AOI. The presence of methylene chloride in the groundwater sample at DWD12 does not appear to be due to a release at any AOI, as it is generally considered a common laboratory contaminant (U.S. EPA, 1989). During the two previous rounds of groundwater sampling at this location the methylene chloride results were non-detect. On October 31, 2003, a groundwater sample and field duplicate were collected from this location to confirm the methylene chloride concentration from May 2003. The analytical results from these samples showed that methylene chloride was not detectable. Therefore, the presence of methylene chloride at this location during previous sampling is not associated with a release from an AOI.

The potential for human exposure to constituents in groundwater with concentrations higher than the screening criteria is discussed in Section 5.2, and the significance of any potential exposure is discussed in Section 5.3.

5.2 Exposure Pathways

The potential for exposure to media affected by the potentially significant releases identified in Section 5.1 under current conditions and reasonably expected future land use is discussed below.

Soil

Contaminated soil identified at AOIs F-7, F-15, M-2, and M-19 is covered by building floors or pavement, which prevents current exposure of workers engaged in routine activities or exposure of trespassers. However, potential exposure of workers engaged in subsurface construction activities at these AOIs is possible, and potential exposure of workers engaged in routine activities is possible if building floors or pavement in these areas were removed in the future. Contaminated soil at AOIs P-9, P-11, W-1, W-8, W-9, and the Area of Industrial Redevelopment is not covered or not entirely covered, so potential exposure of workers engaged in routine activities and subsurface construction activities, and exposure of trespassers is possible. At AOIs M-2 and M-16, potential exposure of workers via direct contact with LNAPLs during subsurface construction activities and potential exposure of routine workers via assumed vapor migration from LNAPLs into indoor air of existing manufacturing buildings is also possible.

Groundwater

As discussed in Section 3.7 of the RFI Report (ENCORE, 2002b), the Site and the immediate vicinity obtain potable water from the City of Detroit, and do not rely on local groundwater in any of the saturated zones as a drinking water supply. Therefore, drinking water exposure of workers and residents at and around the Site is not expected. However, potential exposure of workers to groundwater in the shallow saturated zone during subsurface construction activities is possible because the water table at the Site at many locations is shallower than the expected maximum excavation depths of 10 to 12 ft bgs. No current exposure to groundwater in the intermediate and deep saturated zones is expected because these zones are deeper than the expected maximum excavation depths, and groundwater from these zones is not currently used for any purpose at the Site or in the immediate vicinity.

The potential significance of exposures via the complete pathways identified above is discussed in Section 5.3.

5.3 Significance of Potential Exposures

The significance of potential exposures, from complete exposure pathways, identified in Section 5.2 is discussed below.

5.3.1 Soil

The significance of potential exposures to soil contamination can be evaluated by estimating the cumulative cancer and noncancer risks associated with the potential exposures and comparing them with the U.S. EPA-established levels for determining whether corrective measures are warranted under RCRA Corrective Action. Under U.S. EPA policy, corrective measures are not warranted when the site-related cumulative cancer risk does not exceed 10^{-4} and the noncancer hazard index (HI) does not exceed 1 (61 FR 19432, May 1, 1996; U.S. EPA, 1991b).

Upper-bound estimates of high-end cumulative cancer and noncancer risks for potential exposure of workers to soil at the AOIs identified in Section 5.1.1 are shown in Table 5-3. These upper-bound estimates are calculated using the highest concentration of each constituent detected in soil at each area, and the conservative exposure factors that were used to derive the U.S. EPA Region 9 risk-based preliminary remediation goals (PRGs) for soil in generic commercial/industrial settings (U.S. EPA, 2002a). High-end cumulative cancer and noncancer risk estimates for an area would be lower if concentrations representative of the area were used instead of the highest concentrations, and if site-specific exposure factors were used to account for the magnitude, frequency, and duration of exposures appropriate for the particular area, as would be done in risk assessments following U.S. EPA guidance (1989). These upper-bound estimates of high-end cumulative cancer and noncancer risks for routine workers also represent conservative estimates of risks for potential exposure of workers during occasional maintenance/construction activities and for potential exposure of trespassers (ENVIRON, 2003).

As summarized in Table 5-3, these upper-bound estimates of cumulative cancer risk and HI do not exceed 10^{-4} or 1, respectively, for the following AOIs where supplemental RFI activities were completed:

- AOI F-7 (Wastewater Collection Sumps at Fiero Powerhouse)
- AOI F-15 (Oil/Solvent Catch Basin)
- AOI M-2 (Former Plating Operations Area)
- AOI P-9 (Pipeline Release Investigation)
- AOI P-11 (Trestle Pipeline Release Investigation)

This means that there are no unacceptable exposures at these AOIs, except these calculations do not address the potential for indoor air exposure at AOIF-15 which was evaluated in Section 5.3.1 of the RFI Report and found to present no unacceptable exposure.

Potential exposures at AOIs W-1, W-8, W-9, and the proposed Area of Industrial Redevelopment are further evaluated below by developing conservative estimates of the average concentrations for certain chemicals at each AOI to provide more representative concentrations to which receptors might be exposed under current and reasonably expected future conditions. Potential exposures of construction workers during activities in the proposed Area of Industrial Redevelopment are also evaluated using a larger-scale, short-term construction scenario that might be associated with redevelopment of this part of the Site.

Conservative estimates of the average concentrations are calculated as 95% upper confidence limits (UCLs) on the means of surface (0 to 2 ft) and depth-averaged (0 to 10 ft) concentrations at each sampling location for evaluating potential exposure of routine workers/trespassers and construction workers, respectively. Data that consist of non-detects are conservatively replaced with one-half sample quantitation limits (SQLs), and unusually high SQLs are handled as recommended in U.S. EPA guidance (U.S. EPA, 1989).

The 95% UCL for each chemical is calculated using the nonparametric bootstrap method known as the bias-corrected and accelerated (BCa) method with 4,000 bootstrap replications (Efron and Tibshirani, 1998). A nonparametric bootstrap confidence interval does not rely on assumptions about the data's underlying probability distribution which are often difficult to confirm, but instead are based on statistical re-sampling of the empirical distribution of the observed concentrations. For an empirical distribution that is approximately normal, the bootstrap confidence interval will be essentially the same as the normal confidence interval. For an empirical distribution that is not normal, however, the bootstrap confidence interval will be more accurate than a confidence interval calculated assuming a normal (or even lognormal) distribution (U.S. EPA, 1997b).

Table 5-4a shows the high-end estimates of cumulative cancer risk and HI for AOIs W-1, W-8, W-9, and the proposed Area of Industrial Redevelopment that are based on 95% UCLs for certain chemicals at each AOI. The chemicals chosen for 95% UCL calculations at each AOI are those with maximum concentrations that contribute most significantly to the cumulative cancer and noncancer risks. Using 95% UCLs for these chemicals and maximum concentrations for other chemicals still overestimates cumulative risks, but is an efficient approach that is consistent with U.S. EPA guidance (1989; page 6-25). As shown on this table, these high-end estimates of cumulative cancer risk and HI do not exceed 10^{-4} or 1, respectively, except for the construction worker scenario at AOIW-1. The calculation of these cumulative cancer and noncancer risk estimates is provided in Appendix F.1 and is discussed below.

The construction worker scenario for AOIW-1 is further evaluated using exposure factors for a construction scenario at the Site. Table 5-4b summarizes the estimates of cumulative cancer risk and HI for construction workers at AOIW-1, which do not exceed 10^{-4} or 1, respectively, as shown in the calculations provided in Appendix F.2. This means that there is no unacceptable current exposure to soil at these AOIs.

AOIW-1 (West Yard)

Potential exposure of routine workers to surface soil in unpaved areas and potential exposure of construction workers to surface and subsurface soil at AOIW-1 are possible. The estimates of cancer risk and HQ shown in Appendix F.1 are calculated using the maximum concentrations of each chemical detected in surface soil at AOIW-1, except bootstrap 95% UCLs are used for benzene (0.1 mg/kg), xylenes (0.25 mg/kg), benzo(a)pyrene (2.4 mg/kg), 2-methylnaphthalene (6.6 mg/kg), naphthalene (23 mg/kg), PCBs (0.8 mg/kg), antimony (6.7 mg/kg), arsenic (16 mg/kg), chromium (437 mg/kg), copper (418 mg/kg), iron (127,000 mg/kg), manganese (2,460 mg/kg), mercury (0.1 mg/kg), thallium (2.2 mg/kg), and 2,3,7,8-TCDD TEQ (3.8×10^{-5} mg/kg). As shown in Table 5-4a, the estimated high-end cumulative cancer risk and HI at AOIW-1 based on these exposure concentrations are approximately 4×10^{-5} and 1, respectively.

The calculations in Appendix F.1 assume that workers contact contaminated soil during the entire workday for 250 days per year and 25 years (U.S. EPA, 2002a). However, the frequency of potential exposure of workers to soil at AOIW-1 is expected to be much lower. Currently, many of the areas where concentrations are higher than the screening criteria are covered with gravel or concrete. No routine activity is being conducted in these areas, so workers currently have little opportunity for direct contact with soil in this area. Potential future exposures of routine workers at the Area of Industrial Redevelopment are evaluated separately below. The frequency of current exposure to contaminated soil at AOIW-1 is expected to be on the order of only a few days a year at most. This means the calculations in Appendix F.1 are conservative high-end estimates of cumulative cancer and noncancer risks for routine workers at AOIW-1.

The estimates of cancer risk and HQ for workers who perform occasional construction that involves excavating into subsurface soil are calculated in Appendix F.2. These estimates are calculated using the maximum concentrations of each chemical detected at AOIW-1, except depth-averaged bootstrap 95% UCLs are used for 2-methylnaphthalene (12 mg/kg), naphthalene (18 mg/kg), PCBs (14 mg/kg), and manganese (1,860 mg/kg) for the construction worker scenario. As shown in Table 5-4b, the estimated high-end cumulative cancer risk and HI for this scenario at AOIW-1 based on these exposure concentrations are approximately 1×10^{-5} and 0.6, respectively.

The calculations in Appendix F.2 assume that workers contact surface and subsurface soil during the entire workday for 5 days per year and 10 years (ENVIRON, 2003), which are conservative estimates on how long a typical construction worker may be involved in construction at GM Sites. Potential future exposures of construction workers at the Area of Industrial Redevelopment are evaluated separately below. The frequency of current exposure to soil at AOIW-1 is expected to be on the order of only a few days per year at most. This means the calculations in Appendix F.2 are conservative high-end estimates of cumulative cancer and noncancer risks for occasional excavations at AOIW-1.

Since the risk estimates for potential exposure of both routine and construction workers do not exceed U.S. EPA's acceptable cancer risk range of 10^{-6} to 10^{-4} and HI limit of 1 (U.S. EPA, 1991b), the concentrations of chemicals in soil at AOIW-1 do not pose an unacceptable risk.

AOIW-8 (Former Plant 9 Basement AST Area)

Potential exposure of routine workers to surface soil in unpaved areas and potential exposure of construction workers to surface and subsurface soil at AOIW-8 are possible. The estimates of cancer risk and HQ shown in Appendix F.1 are calculated using the maximum concentrations of each chemical detected at AOIW-8, except a 95% UCL is used for antimony (12 mg/kg), chromium (325 mg/kg), copper (2610 mg/kg), and mercury (0.59 mg/kg). As shown in Table 5-4a, the estimated high-end cumulative cancer risk and HI at AOIW-8 based on these exposure concentrations are approximately 7×10^{-5} and 0.9, respectively.

The calculations in Appendix F.1 assume that workers contact surface or subsurface soil during the entire workday for 250 days per year and 25 years (U.S. EPA, 2002a). However, the frequency of potential exposure of workers to soil at AOIW-8 is expected to be much lower. Currently, many of the areas where concentrations are higher than the screening criteria are covered with gravel or concrete. No routine activity is being conducted in these areas, so workers currently have little opportunity for direct contact with soil in this area. Construction activity is being planned for the portions of AOIW-8 that will be used for the Area of Industrial Redevelopment. The areas that will be used for the Area of Industrial Redevelopment are evaluated separately below. The frequency of current exposure to contaminated soil at AOIW-8 is expected to be on the order of only a few days a year at most. This means the calculations in Appendix F.1 are conservative high-end estimates of cumulative cancer and noncancer risks at AOIW-8. Since these estimates do not exceed U.S. EPA's acceptable cancer risk range of 10^{-6} to 10^{-4} and HI limit of 1 (U.S. EPA, 1991b), the concentrations of chemicals in soil at AOIW-8 do not pose an unacceptable risk.

AOIW-9 (Former Central Foundry Resin Spill and UST)

Potential exposure of routine workers to surface soil in unpaved areas and potential exposure of construction workers to surface and subsurface soil at AOIW-9 are possible. The estimates of cancer

risk and HQ shown in Appendix F.1 are calculated using the maximum concentrations of each chemical detected at AOIW-9, except bootstrap 95% UCLs are used for benzo(a)pyrene and PCBs. The bootstrap 95% UCLs on the mean concentrations are approximately 1.5 and 3.6 mg/kg, for benzo(a)pyrene and PCBs, respectively. As shown in Table 5-4a, the estimated high-end cumulative cancer risk and HI at AOIW-9 based on these exposure concentrations are approximately 4×10^{-5} and 0.9, respectively. These calculations do not include the data at and around soil boring BW9-02, because that area is currently fenced to prevent unauthorized worker access until corrective measures to address the presence of PCBs in the soil is completed, which is discussed in the CMP Report (ENCORE, 2003j). The restricted-access area around boring BW9-02 is shown on Figure 4-12.

The calculations in Appendix F.1 assume that workers contact contaminated soil during the entire workday for 250 days per year and 25 years (U.S. EPA, 2002a). However, the frequency of potential exposure of workers to soil at AOIW-9 is expected to be much lower. Currently, many of the areas where concentrations are higher than the screening criteria are covered with gravel or concrete. No routine activity is being conducted or planned in these areas, so workers currently have little opportunity for direct contact with soil in this area. Construction activity is being planned for the portion of AOIW-9 that will be used for the Area of Industrial Redevelopment, which is evaluated separately below. The frequency of current exposure to contaminated soil at AOIW-9 is expected to be on the order of only a few days a year at most. This means the calculations in Appendix F.1 are conservative high-end estimates of cumulative cancer and noncancer risks at AOIW-9. Since these estimates do not exceed U.S. EPA's acceptable cancer risk range of 10^{-6} to 10^{-4} and HI limit of 1 (U.S. EPA, 1991b), the concentrations of benzo(a)pyrene, PCBs, and other chemicals in soil at AOIW-9 outside the restricted-access area shown on Figure 4-12 do not pose an unacceptable risk.

Proposed Area of Industrial Redevelopment

Potential exposure of routine workers to surface soil in unpaved areas and potential exposure of construction workers to surface and subsurface soil at the proposed Area of Industrial Redevelopment are possible. The estimates of cancer risk and HQ shown in Appendix F.1 are calculated using the maximum concentrations of each chemical detected in the surface soil at the proposed Area of Industrial Redevelopment, except bootstrap 95% UCLs are used for xylenes (0.1 mg/kg), benzo(a)pyrene (1.3 mg/kg), 2-methylnaphthalene (2.9 mg/kg), naphthalene (9.7 mg/kg), PCBs (1.6 mg/kg), antimony (3.7 mg/kg), arsenic (12 mg/kg), chromium (279 mg/kg), copper (333 mg/kg), iron (157,000 mg/kg), manganese (1,620 mg/kg), mercury (0.14 mg/kg), thallium (1.2 mg/kg), and 2,3,7,8-TCDD TEQ (4.4×10^{-5} mg/kg). As shown in Table 5-4a, the estimated high-end cumulative cancer risk and HI at the proposed Area of Industrial Redevelopment based on these exposure concentrations are approximately 4×10^{-5} and 1, respectively. Like the calculations for AOIW-9 discussed above, these calculations also do not include the data at and around soil boring BW9-02, because that area is currently fenced to prevent unauthorized worker access until corrective

measures to address the presence of PCBs in the soil is completed. The restricted-access area around boring BW9-02 is shown on Figure 4-12.

The calculations in Appendix F.1 assume that workers contact contaminated soil during the entire workday for 250 days per year and 25 years (U.S. EPA, 2002a). However, the frequency of potential exposure of workers to soil at the proposed Area of Industrial Redevelopment is expected to be much lower. Currently, many of the areas where concentrations are higher than the screening criteria are covered with gravel or concrete. If the proposed Area of Industrial Redevelopment is initiated, some or all of these areas may be under the building, pavement, or other ground cover that would prevent or limit contact by workers during routine activities, depending on the final construction plans for the distribution center. Under the current construction plans, the Area of Industrial Redevelopment would occupy approximately 970,000 sq ft and paved areas would cover 1,700,000 sq ft, which constitutes a total of approximately 89% of the Area of Industrial Redevelopment. This means the calculations in Appendix F.1 are conservative high-end estimates of cumulative cancer and noncancer risks at the Area of Industrial Redevelopment. These estimates of risk are also conservative estimates for potential exposure of workers conducting excavations during occasional maintenance activities and potential exposure of trespassers (ENVIRON, 2003).

For the larger-scale, short-term construction scenario, an exposure frequency of up to approximately 125 days over a period of 1 year is expected to give estimates of cancer and noncancer risks that are within the acceptable limits, as discussed further in Appendix F.2. These estimates of risks are calculated using the maximum concentrations of each chemical detected at the Area of Industrial Redevelopment, except depth-averaged bootstrap 95% UCLs are used for xylenes (0.55 mg/kg), benzo(a)pyrene (5 mg/kg), 2-methylnaphthalene (2.6 mg/kg), naphthalene (1.4 mg/kg), PCBs (2.9 mg/kg), antimony (4.5 mg/kg), arsenic (8.8 mg/kg), total chromium (119 mg/kg), cobalt (9 mg/kg), copper (983 mg/kg), iron (37,600 mg/kg), manganese (799 mg/kg), mercury (0.25 mg/kg), and thallium (1.2 mg/kg). The maximum concentrations and 95% UCL concentrations do not include the following samples: BW1-02-S(0-2), BW1-03-S(0-2), BW1-07-S(0-2), BW1-09-S(0-2), BW9-03-S(0-2)072803, BMWW8-02-S(0-2), SBSB5-04.0, SSTT4 (0-6), SSTT5 (0-6), SW8-03-S(0-2), SW8-04-S(0-2), SW8-05-S(0-2), SW8-09-S(0-2), SSTT2 (0-6), and SBTT3-5.0. Concentrations in these samples would present an unacceptable risk for a larger scale, short-term construction scenario. Larger-scale, short-term construction in these areas will be restricted in the updated Due Care Plan (to be revised in January 2004) until final industrial redevelopment plans have been finalized. Once the final redevelopment plans have been determined, this area will be reevaluated to determine the appropriate soil removal actions required, if any. As shown in Table 5-4c, the estimated high-end cumulative cancer risk and HI for this scenario at the Area of Industrial Redevelopment based on the exposure concentrations discussed above are approximately 9×10^{-6} and 1, respectively.

Since the risk estimates for potential exposure of both routine and construction workers do not exceed U.S. EPA's acceptable cancer risk range of 10^{-6} to 10^{-4} and HI limit of 1 (U.S. EPA, 1991b), the concentrations of chemicals in soil, excluding the samples listed above, at the Area of Industrial Redevelopment do not pose an unacceptable risk.

As noted in Section 5.1.1 and in Sections 4.3.2 and 4.3.7 of this Report, subsurface soil at AOIs M-2 and M-16 contains LNAPL at the water table. The LNAPLs at these AOIs have constituents with concentrations that correspond to theoretical upper-bound smear zone soil concentrations that exceed the soil screening criteria used in Section 5.1.1. The significance of potential exposure of workers to these constituents during excavation associated with occasional maintenance or construction activities is evaluated in Appendix F.2. Potential exposure of workers via direct contact with the LNAPLs and inhalation of vapors from exposed LNAPL is also evaluated in Appendix F.2, which discusses the exposure concentrations, exposure factors, toxicity values, and risk calculations used to evaluate these pathways. As noted above, no construction is actually being conducted or is planned at these areas.

The cumulative cancer risk and HI for each exposure pathway for each LNAPL area are summarized on Table 5-5.

These estimates are calculated using the highest concentration of each constituent detected in each LNAPL at AOIs M-2 and M-16. This summary shows that potential exposure of workers conducting excavations during occasional maintenance or construction activities is not expected to result in significant cancer or noncancer risks. The same evaluation for the LNAPLs at AOIs W-1, W-8, and W-10 was discussed in Section 5 of the RFI Report (ENCORE, 2002b).

The LNAPLs at AOI M-2 and AOI M-16 are under existing manufacturing buildings, and the LNAPL at AOI W-8 (which was identified during the original RFI activities and discussed in the RFI Report (ENCORE, 2002b)) could become located under a proposed building in the Area of Industrial Redevelopment. To evaluate the potential for significant exposure if constituents of the LNAPLs at AOIs M-2, M-16, and W-8 were to migrate through the foundation of a building, a simplified and conservative approach is used in which vapor concentrations in equilibrium with each LNAPL (source vapor concentrations) are estimated and directly compared with inhalation limits. As shown in Appendix F.3, these ratios are all less than 1.

The approach presented in Appendix F.3 is highly conservative since these estimated vapor concentrations would undergo attenuation if they migrate through the soil and any foundation cracks into indoor air. Conservative attenuation coefficients for VOCs are typically on the order of 10,000-fold or more. This means that the indoor air concentrations of VOCs due to vapor intrusion, if

vapor intrusion were to occur, would be at least 10,000 times lower than the source vapor concentrations, and the ratios shown in Appendix F.3 also would be at least 10,000 times lower.

To illustrate this point, attenuation coefficients are calculated in Appendix F.3 using the generic commercial/industrial building characteristics recommended by MDEQ (2002), a conservative separation of 1.5 m between the subsurface vapor source and the building (based on site-specific depth to the water table), and assuming that soil between the LNAPL and the building consists of only sand. Even with these assumptions, which are highly conservative for the existing buildings overlying the LNAPL at AOIM-2, AOIM-16, and the proposed Area of Industrial Redevelopment, the attenuation coefficients are at least approximately 10,000-fold. These calculations show that the LNAPL constituents, if assumed to migrate into indoor air, would not exceed any occupational inhalation limit and would contribute insignificantly to indoor air concentrations that include chemicals from occupational sources.

5.3.2 Groundwater

As discussed in Section 5.2, potential current exposure to groundwater at and around the Site is limited to worker contact with groundwater in the shallow unconfined water table zone during excavation activities that extend into the water table. Screening criteria for evaluating the significance of these potential current exposures do not need to include the screening criteria that are based on residential drinking water use, which are used in the evaluation discussed in Section 5.1.2. Instead, the evaluation of significance is more appropriately conducted using only the screening criteria that are based on worker contact with groundwater while performing excavations. Comparison of the data from monitoring wells screened in the shallow unconfined water table zone with these criteria is included in the right-most column in Table 5-2a. The ratios in this column show that the only instances where concentrations exceed these screening criteria are for 2,3,7,8-TCDD TEQ at AOIs W-1 and W-8, and for PCBs at AOIW-1. As discussed in Section 5.1.2, these samples were evaluated in Section 5.3.1 of the RFI Report (ENCORE, 2002b). Section 5.3.2 of the RFI Report (ENCORE, 2002b) concluded that the aqueous-phase concentrations in the groundwater do not pose a significant risk to workers who might contact groundwater while performing occasional excavations.

The significance of potential exposure of workers to constituents in LNAPL during occasional excavations is evaluated in Appendix F.2, and the results of the calculations are summarized above in Section 5.3.1. The results show that the estimates of cumulative cancer and noncancer risks associated with such exposures at AOIs M-2 and M-16 do not exceed 10^{-4} or HI of 1, respectively. These risk estimates show that such exposures would not pose a significant risk.

The significance of potential exposure of workers to vapors that are assumed to migrate from LNAPL into buildings is evaluated in Appendix F.3, and the results of the evaluation are summarized

above in Section 5.3.1. The results show that the assumed contribution of LNAPL vapor concentrations to indoor air mixtures that include chemicals from occupational sources would be insignificant.

5.4 Conclusions

Soil and groundwater at a number of AOIs at the Site are considered to have been affected by potentially significant releases when the highest constituent concentrations in these media are compared with generic risk-based screening criteria. However, when the likelihood of complete exposure pathways, current Site-specific conditions, and 95% UCLs rather than the highest concentrations are considered, the concentrations of constituents in these media do not present a significant exposure, except one area at AOIW-9 where GM has developed a corrective measure (ENCORE, 2003j) and a few areas at the proposed Area of Industrial Redevelopment where results will be reevaluated, following finalization of redevelopment plans, to address the presence of contaminants in surface and subsurface soil. GM has restricted worker access to the area at AOIW-9 until the corrective measures are completed. Similarly, GM has restricted any large-scale construction activities in the proposed Area of Industrial Redevelopment until the corrective measures in that area are completed.

6. Summary/Conclusions

The supplemental RFI included field investigations at the following AOIs and other areas:

Fiero

AOI F-7: Wastewater Collection Sumps

AOI F-8: Paint Sludge Storage Area Form

AOI F-15: Oil/Solvent Catch Basin

Demolition Area

AOI W-1: West Yard

AOI W-8: Former Plant 9 Basement AST Area

AOI W-9: Former Central Foundry (Plant 6) Resin Spill and UST

AOI W-10: Railroad Marshalling Area Drainage System

Metal Fabrication Division

AOI M-1: WWTP

AOI M-2: Former Plating Operations Area

AOI M-4: Plant 25 Former Gasoline UST and Current Gasoline UST Location

AOI M-5: Former A-2 Fill Area

AOI M-7: ELPO Building

AOI M-9: Heat Treat Oil Storage Area

AOI M-16: Plant 25 Basement Sump Area

AOI M-25: Plant 33 Basement Sump Area

Powertrain

AOI P-6: Former UST Farm and Stoddard Solvent AST

AOI P-9: Pipeline Release;

AOI P-10: Former Plant 18

AOI P-11: Trestle Pipeline Release

Other

Storm Water Detention Facility

The objectives of supplemental RFI activities were to complete investigations necessary to:

- Determine hydrogeologic conditions, as necessary, to properly investigate releases from the new AOIs;

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- Characterize the nature and extent of releases of hazardous waste and/or hazardous constituents in environmental media at the new AOIs;
 - Assess potential risk to human health and the environment associated with releases of hazardous waste and/or hazardous constituents at the new AOIs;
 - Provide sufficient data to support the RCRA corrective action EI determination for the new AOIs;
 - Determine whether interim corrective measures are necessary to control current unacceptable risks, if any, to human health at the new AOIs;
 - Determine whether corrective measures are necessary to mitigate current and future unacceptable risks, if any, to human health and the environment for the new AOIs;
 - Determine the impact, if any, from discharges from the new AOIs to off-Site areas;
 - Determine the impact, if any, below several sumps and pits;
 - Fulfill provisions for a second round of groundwater sampling, as described in the RFI Work Plan (ENCORE, 2001b);
 - Provide further characterization of groundwater quality at existing AOIs based on U.S. EPA comments on the CA750/CA725 determination;
 - Monitor Site-wide groundwater conditions by completing two semi-annual sampling events (November 2002 and May 2003); and
 - Delineate free product plumes.

Based on the results of the supplemental RFI field investigations it was determine that a potentially significant release has occurred at 14 AOIs and the SWDF. The findings of the field investigation are discussed in Section 4 of this Report. The potential health significance of the constituents found in soil, groundwater, and LNAPL are discussed in a risk evaluation presented in Section 5 of this Report.

6.1 No Significant Release Found

Among the AOIs and off-Site areas investigated during the supplemental RFI, the following have no significant release of hazardous constituents to the environment. The determination is based on a conservative approach in which the highest concentration of a constituent at an area is compared with screening criteria:

Fiero

AOI F-8: Paint Sludge Storage Area Form

Metal Fabrication Division

AOI M-7: ELPO Building

AOI M-9: Heat Treat Oil Storage Area

AOI M-25: Plant 33 Basement Sump Area

Powertrain

AOIP-10: Former Plant 18

The results of the RFI indicate that no further investigation of these areas is warranted.

6.2 AOIs Discussed In Risk Evaluation

A release of hazardous constituents was identified at 14 AOIs and the SWDF, based on a conservative approach in which the highest concentrations of a constituent at an AOI or area were compared against screening criteria. Using the RFI characterization data on the nature and extent of constituents at these areas, the health significance of these releases under current and reasonably expected future land use were evaluated. The finding of the RFI field investigation and conclusion of the risk evaluation are summarized below:

Fiero

AOIF-7: Wastewater Collection Sumps

A release was identified based on the presence of 1,1-dichloroethene and tetrachloroethene within groundwater. However, the results of the risk evaluation indicate that this area does not pose an unacceptable health risk. NFA is proposed for soils. Groundwater at this AOI will be addressed in the CMP.

AOIF-15: Oil/Solvent Catch Basin

A release was identified based on the presence of tetrachloroethene in the soil at concentrations greater than the screening criteria. However, the results of the risk evaluations presented in the RFI Report (ENCORE, 2002b) and in this Report indicate that this area does not pose an unacceptable health risk, therefore, NFA is required.

Demolition Area

AOIW-1: West Yard

A release was identified based on the presence of lead, manganese, chromium and PCBs in the soil and select VOCs, inorganics, PCBs, and dioxins in the groundwater at concentrations higher than the screening criteria. The results of the risk evaluations presented in the RFI Report (ENCORE, 2002b) and in this Report indicate that this area does not pose an unacceptable health risk. NFA is required for soils. An LNAPL plume (LNAPL Area No. 1) is present in this AOI. This AOI will be evaluated further in the CMP.

AOIW-8: Former Plant 9 Basement AST Area

A release was identified based on the presence of arsenic, manganese, chromium, and lead in the soil and select inorganics, PCBs, and dioxins in the groundwater at concentrations higher than the

Tables

TABLE 1-1 GENERAL MOTORS CORPORATION PONTIAC NORTH CAMPUS, PONTIAC, MICHIGAN															
RCRA FACILITY INVESTIGATION															
SUMMARY OF SUPPLEMENTAL RFI ACTIVITIES, RESULTS, AND PROPOSED FURTHER ACTIVITY															
AOI #	AOI Description	Summary of Primary Materials Managed	Reason for Investigation						Supplemental RFI No. 1 Activities	Soil Laboratory Analysis Performed	Groundwater Laboratory Analysis Performed	Analytical Results That Exceed Part 201 Industrial Criteria		RFI Report Proposed Activity	Supplemental RFI Report No. 1 Proposed Activity
			Semi- Annual Sampling*	Second Round Sampling	Pits/ Sumps	Remediation Design	Other	RFI Work Plan Addendum				Soil	Groundwater		
Study Area 1 - Fiero															
F-7	Wastewater Collection Sumps - Located in the basement of the Powerhouse	- Industrial wastewater			X			8	- Cleaned and repaired sumps - Installed 1 groundwater monitoring well - Collected 1 soil sample - Collected 3 groundwater samples	- VOCs - SVOCs - PCBs - Inorganics	- 1,1-DCE - TCE	No exceedances	1,1-DCE (0.013 mg/L) TCE (0.0062 mg/L)	Sump pits to be repaired	Soil: NFA Groundwater: Perform CMP
F-8	Paint Sludge Storage Area - Located north of Building 17 - The concrete pad is 12 by 24 ft and is unbermed - It is covered with a corrugated roof	- Storage of nonhazardous paint sludge and sludge from filtering waste bonderite			X				- 1 subsurface soil sample collected	- VOCs - SVOCs - PCBs - Inorganics		No exceedances		Trench and sump to be properly abandoned	NFA
F-15	Fuel AST Area: Oil/Solvent Catch Basin - Located in the Fiero Loading dock - Contents of catch basin was an oil sludge - Catch basin cleaned and inspected	- Unknown			X			8	- Completed 3 soil borings	- VOCs		No exceedances		Catch basin to be properly abandoned	NFA
Study Area 2 - Demolition Area															
W-1	West Yard - Approximately 20 acres in size - Entire yard was historically used for materials management activities, including: - Disposal of foundry sand, refuse, sludge and trash; - The storage of hazardous waste (former hazardous waste storage pad); - Former railroad marshalling area; and - a backfilled settling basin	- Impacted soils, groundwater, and LNAPL containing VOCs, SVOCs, metals, PCB and Dioxins	X	X				9	- Completed 1 soil boring - 3 groundwater samples collected - Groundwater samples were collected at selected, previously installed, downgradient wells (DWD-13, MWW1-04, MWW1-05)	- VOCs - SVOCs - PCBs - Inorganics	- MWW1-04 & -05 PCBs only - DWD13 VOCs, SVOCs, PCBs, Inorganics - Semi-annual wells - VOCs, SVOCs, PCBs, Inorganics, Dioxins, and Furans	Arsenic (9 mg/kg) Manganese (7,260 mg/kg) Chromium (total) (340 mg/kg)	Total PCBs (0.0013 mg/L) Vanadium (0.0484 mg/L)* Manganese (1.2 mg/L)* Methylene chloride (0.3 mg/L)* Acetone (12 mg/L)*	Perform CMP	Soil: NFA Groundwater: Perform CMP LNAPL: Perform CMP
W-8	Plant 9-Basement - 12 ASTs ranging in size from 2,000 gal to 14,000 gal - The tanks were located along the north side of Plant 9 basement - Kerosene-like odors noticed in storm sewer in this area	- Kerosene - Coolant (141-KC)		X				9	- Completed 5 soil borings - Collected 6 groundwater samples - Installed 2 recovery wells - Installed 3 groundwater monitoring wells - Evaluated 11 soil borings for the presence of LNAPL (no samples collected)	- VOCs - SVOCs - PCBs - Inorganics	- VOCs - SVOCs - PCBs - Inorganics - Methylene chloride (Nov. 2003 sample only)	Arsenic (54 mg/kg) Manganese (1,990 mg/kg) Chromium (total) (363 mg/kg) Lead (8,440 mg/kg)	Manganese (5.41 mg/L) Nickel (0.307 mg/L) Lead (0.122 mg/L) Vanadium (0.239 mg/L) Arsenic (0.0849 mg/L) Beryllium (0.0054 mg/L) Chromium (total) (0.295 mg/L) Cobalt (0.0879 mg/L) Thallium (0.003 mg/L) 2,4-Dimethylphenol (2.5 mg/L) Total methylphenols (4.6 mg/L)	Perform CMP	Soil: NFA Groundwater: Perform CMP LNAPL: Perform CMP
W-9	Former Central Foundry (Plant 6) - Formerly located east of the West Yard - Produced gray iron from metallic ore to be casted into automotive parts - Operations ceased in 1987 and the plant was demolished in 1995 - 20,000 gal. UST	- Gasoline - Metals - PCBs - Arsenic - Resin	X					9	- Completed 9 soil borings - Collected 4 groundwater samples - Installed 2 groundwater monitoring wells - Evaluated 9 soil borings for the presence of LNAPL - Collected 1 LNAPL sample	- VOCs - SVOCs - PCBs - Inorganics	- VOCs - SVOCs - PCBs - Inorganics - Semi-annual wells - VOCs, SVOCs, PCBs, Inorganics, Dioxins, and Furans	Manganese (3,680 mg/kg)	Lead (0.0391 mg/L)	Perform CMP	Perform CMP
W-10	Railroad Marshalling Area Drainage System - Extends the entire length of the west boundary of the West Yard - Used for the temporary storage of railcars loaded with scrap metal and grinding waste to be shipped off-site - A drainage system was installed in 1972 to collect the waste draining out of the railcars - The marshalling area is no longer used for the storage of railcars, although the drainage system remains in place	- Waste from metal chips - Oils - PCBs	X	X					- Collected 4 groundwater samples		- VOCs - SVOCs - PCBs - Inorganics - Semi-annual wells - VOCs, SVOCs, PCBs, Inorganics, Dioxins, and Furans		No exceedances	Perform CMP	Soil: NFA Groundwater: Perform CMP LNAPL: Perform CMP
Study Area 3 - Metal Fabrication Division															
M-1	Wastewater Treatment Plant (WWTP) - Located west of Plants 5/23 and Plant 14 - Included up to 55 ASTs historically utilized for the WWTP - Ground cover includes pavement, gravel, and grass - Known releases included alkali/oily water, cyanide plating solution, acidic alkali water, lime slurry, reclaimed oil, storing metallic water, chrome solution, and cyanide solution. - History of exceedances of lead, phenol, and Chromium VI at sanitary sewer outfall 003	- Treated metals (including chromium VI) - Treated alkali/oily wastes - Oil - Sludge - Sulfuric Acid - Lime, Alum, Polymer, Caustic - Pickle Liquid						8	- Installed 3 monitoring wells - Collected 5 groundwater samples		- Cyanide		Cyanide (1.3 mg/L)	NFA	Soil: NFA Groundwater: Perform CMP

TABLE 4-2
GENERAL MOTORS CORPORATION
PONTIAC NORTH CAMPUS - PONTIAC, MICHIGAN

RCRA FACILITY INVESTIGATION

DATA SUMMARY FOR AOI F-07 (SOIL)

Chem Group	Chemical	CASRN	Carc Class	No of Analyses	No of Detects	Min Detected (mg/kg)	Max Detected (mg/kg)	Min QL (mg/kg)	Max QL (mg/kg)	Site Specific Background (mg/kg)	Industrial Soil Volatilization to Indoor Air Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Soil Volatilization to Indoor Air Inhalation Criteria	Industrial Infinite Source Volatile Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Volatile Soil Inhalation Criteria	Industrial Particulate Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Particulate Soil Inhalation Criteria	Industrial Direct Contact Criteria (mg/kg)	Ratio of Max Detect to Industrial Direct Contact Criteria	Residential Soil Volatilization to Indoor Air Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Soil Volatilization to Indoor Air Inhalation Criteria	Residential Infinite Source Volatile Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Infinite Source Volatile Soil Inhalation Criteria	Residential Particulate Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Particulate Soil Inhalation Criteria	Residential Direct Contact Criteria (mg/kg)	Ratio of Max Detect to Residential Direct Contact Criteria
VOC	Acetone	67-64-1	ID	8	4	1.20E-02	7.10E-01	2.20E-03	7.40E-02		1.1E+05	6.5E-06	1.6E+05	4.4E-06	1.7E+08	4.2E-09	7.3E+04	9.7E-06	1.1E+05	6.5E-06	1.3E+05	5.5E-06	3.9E+08	1.8E-09	2.3E+04	3.1E-05
VOC	Benzene	71-43-2	A	8	2	1.30E-01	1.60E-01	3.40E-04	1.70E-02		8.4E+00	1.9E-02	4.5E+01	3.6E-03	4.7E+05	3.4E-07	4.0E+02	4.0E-04	1.6E+00	1.0E-01	1.3E+01	1.2E-02	3.8E+05	4.2E-07	1.8E+02	8.9E-04
VOC	Bromodichloromethane	75-27-4	B2	8	1	1.70E-03	1.70E-03	5.40E-04	1.90E-02		6.4E+00	2.7E-04	3.1E+01	5.5E-05	1.1E+05	1.5E-08	4.9E+02	3.5E-06	1.2E+00	1.4E-03	9.1E+00	1.9E-04	8.4E+04	2.0E-08	1.1E+02	1.5E-05
VOC	Bromoform	75-25-2	B2	8				7.20E-04	3.10E-02		7.7E+02		3.1E+03		3.6E+06		8.7E+02		1.5E+02		9.0E+02		2.8E+06		8.2E+02	
VOC	Bromomethane	74-83-9	D	8				1.60E-03	5.00E-02		1.6E+00		1.3E+01		1.5E+05		1.0E+03		8.6E-01		1.1E+01		3.3E+05		3.2E+02	
VOC	2-Butanone	78-93-3	ID	8	2	2.10E-01	2.30E-01	1.50E-03	8.00E-02		2.7E+04	8.5E-06	3.5E+04	6.6E-06	2.9E+07	7.9E-09	2.7E+04	8.5E-06	2.7E+04	8.5E-06	2.9E+04	7.9E-06	6.7E+07	3.4E-09	2.7E+04	8.5E-06
VOC	Carbon Disulfide	75-15-0		8				2.80E-04	6.70E-02		1.4E+02		1.6E+03		2.1E+07		2.8E+02		7.6E+01		1.3E+03		4.7E+07		2.8E+02	
VOC	Carbon Tetrachloride	56-23-5	B2	8				4.90E-04	1.90E-02		9.9E-01		1.2E+01		1.7E+05		3.9E+02		1.9E-01		3.5E+00		1.3E+05		9.6E+01	
VOC	Chlorobenzene	108-90-7	D	8				3.90E-04	1.60E-02		2.2E+02		9.2E+02		2.1E+06		2.6E+02		1.2E+02		7.7E+02		4.7E+06		2.6E+02	
VOC	Chloroethane	75-00-3		8				9.40E-04	7.10E-02		9.5E+02		3.6E+04		2.9E+08		9.5E+02		9.5E+02		3.0E+04		6.7E+08		9.5E+02	
VOC	Chloroform	67-66-3	B2	8	3	6.30E-03	5.70E-02	5.30E-04	9.90E-03		3.8E+01	1.5E-03	1.5E+02	3.8E-04	1.6E+06	3.6E-08	1.5E+03	3.8E-05	7.2E+00	7.9E-03	4.5E+01	1.3E-03	1.3E+06	4.4E-08	1.2E+03	4.8E-05
VOC	Chloromethane	74-87-3	D	8				4.80E-04	2.90E-02		1.0E+01		1.2E+02		2.6E+06		1.1E+03		2.3E+00		4.0E+01		4.9E+06		1.1E+03	
VOC	Cumene	98-82-8	D	8	2	1.10E-01	1.10E-01	5.50E-04	7.80E-03		3.9E+02	2.8E-04	2.0E+03	5.5E-05	2.6E+06	4.2E-08	3.9E+02	2.8E-04	3.9E+02	2.8E-04	1.7E+03	6.5E-05	5.8E+06	1.9E-08	3.9E+02	2.8E-04
VOC	Cyclohexane	110-82-7	ID	8	3	5.30E-02	2.20E+00	4.70E-04	1.30E-03																	
VOC	1,2-Dibromo-3-chloropropane	96-12-8	B2	8				1.10E-03	1.60E-01		1.2E+00		1.5E+01		5.9E+03		1.2E+00		1.2E+00		1.3E+01		1.3E+04		1.2E+00	
VOC	Dibromochloromethane	124-48-1	C	8				6.30E-04	2.50E-02		2.1E+01		8.0E+01		1.6E+05		5.0E+02		3.9E+00		2.4E+01		1.3E+05		1.1E+02	
VOC	1,2-Dibromoethane	106-93-4	B2	8				3.60E-04	3.60E-02		3.6E+00		5.8E+00		1.8E+04		6.7E-01		6.7E-01		1.7E+00		1.4E+04		2.5E-01	
VOC	1,2-Dichlorobenzene	95-50-1	D	8				4.50E-04	3.10E-02		2.1E+02		4.6E+04		4.4E+07		2.1E+02		2.1E+02		3.9E+04		1.0E+08		2.1E+02	
VOC	1,3-Dichlorobenzene	541-73-1	D	8				6.70E-04	1.80E-02								1.7E+02								1.7E+02	
VOC	1,4-Dichlorobenzene	106-46-7	C	8				4.80E-04	3.10E-02		1.0E+02		2.6E+02		5.7E+05		1.9E+03		1.9E+01		7.7E+01		4.5E+05		4.0E+02	
VOC	Dichlorodifluoromethane	75-71-8		8				8.80E-04	7.30E-02		1.7E+03		6.3E+04		1.5E+09		1.0E+03		9.0E+02		5.3E+04		3.3E+09		1.0E+03	
VOC	1,1-Dichloroethane	75-34-3	C	8	3	1.90E-03	2.90E-02	3.10E-04	2.70E-02		4.3E+02	6.7E-05	2.5E+03	1.2E-05	1.5E+07	1.9E-09	8.9E+02	3.3E-05	2.3E+02	1.3E-04	2.1E+03	1.4E-05	3.3E+07	8.8E-10	8.9E+02	3.3E-05
VOC	1,2-Dichloroethane	107-06-2	B2	8				4.40E-04	2.10E-02		1.1E+01		2.1E+01		1.5E+05		4.2E+02		2.1E+00		6.2E+00		1.2E+05		9.1E+01	
VOC	1,1-Dichloroethene	75-35-4	C	8	1	9.10E-03	9.10E-03	5.40E-04	3.30E-02		3.3E-01	2.8E-02	3.7E+00	2.5E-03	7.8E+04	1.2E-07	5.7E+02	1.6E-05	6.2E-02	1.5E-01	1.1E+00	8.3E-03	6.2E+04	1.5E-07	2.0E+02	4.6E-05
VOC	cis-1,2-Dichloroethene	156-59-2	D	8				3.40E-04	3.10E-02		4.1E+01		2.1E+02		1.0E+06		6.4E+02		2.2E+01		1.8E+02		2.3E+06		6.4E+02	
VOC	trans-1,2-Dichloroethene	156-60-5		8				3.90E-04	3.50E-02		4.3E+01		3.3E+02		2.1E+06		1.4E+03		2.3E+01		2.8E+02		4.7E+06		1.4E+03	
VOC	1,2-Dichloropropane	78-87-5	B2	8				3.40E-04	1.80E-02		7.4E+00		3.0E+01		1.2E+05		5.5E+02		4.0E+00		2.5E+01		2.7E+05		1.4E+02	
VOC	1,3-Dichloropropene (total)	542-75-6	B2	8				5.10E-04	2.30E-02		5.4E+00		6.0E+01		5.9E+05		2.4E+02		1.0E+00		1.8E+01		7.8E+05		1.0E+01	
VOC	Ethyl Benzene	100-41-4	D	8	3	1.40E-02	2.50E-01	6.10E-04	7.40E-04		1.4E+02	1.8E-03	2.4E+03	1.0E-04	1.3E+07	1.9E-08	1.4E+02	1.8E-03	8.7E+01	2.9E-03	7.2E+02	3.5E-04	1.0E+07	2.5E-08	1.4E+02	1.8E-03
VOC	2-Hexanone	591-78-6		8				1.30E-03	5.80E-02		1.8E+03		1.3E+03		1.2E+06		2.5E+03		9.9E+02		1.1E+03		2.7E+06		2.5E+03	
VOC	Methyl Acetate	79-20-9		8	2	2.50E-01	3.50E-01	1.10E-03	4.50E-02																	
VOC	Methyl tert-butyl ether	1634-04-4		8				3.10E-04	2.10E-02		5.9E+03		3.0E+04		8.8E+07		5.9E+03		5.9E+03		2.5E+04		2.0E+08		1.5E+03	
VOC	4-Methyl-2-pentanone	108-10-1	ID	8				9.20E-04	5.60E-02		2.7E+03		5.3E+04		6.0E+07		2.7E+03		2.7E+03		4.5E+04		1.4E+08		2.7E+03	
VOC	Methylcyclohexane	108-87-2		8	3	1.30E-01	4.90E+00	4.70E-04	7.40E-04																	
VOC	Methylene Chloride	75-09-2	B2	8				1.40E-03	7.90E-02		2.4E+02		7.0E+02		8.3E+06		2.3E+03		4.5E+01		2.1E+02		6.6E+06		1.3E+03	
VOC	Styrene	100-42-5		8				3.30E-04	3.30E-02		5.2E+02		3.3E+03		6.9E+06		5.2E+02		2.5E+02		9.7E+02		5.5E+06		4.0E+02	
VOC	1,1,2,2-Tetrachloroethane	79-34-5	C	8				4.30E-04	2.10E-02		2.3E+01		3.4E+01		6.8E+04		2.4E+02		4.3E+00		1.0E+01		5.4E+04		5.3E+01	
VOC	Tetrachloroethene	127-18-4	C-B2	8	5	2.80E-03	9.30E-01	5.30E-04	2.00E-02		6.0E+01	1.6E-02	6.0E+02	1.6E-03	6.8E+06	1.4E-07	8.8E+01	1.1E-02	1.1E+01	8.5E-02	1.8E+02	5.2E-03	5.4E+06	1.7E-07	8.8E+01	1.1E-02
VOC	Toluene	108-88-3	D	8	7	3.80E-04	1.50E+00	9.90E-03	9.90E-03		2.5E+02	6.0E-03	3.3E+03	4.5E-04	1.2E+07	1.3E-07	2.5E+02	6.0E-03	2.5E+02	6.0E-03	2.8E+03	5.4E-04	2.7E+07	5.6E-08	2.5E+02	6.0E-03
VOC	1,2,4-Trichlorobenzene	120-82-1	D	8				6.10E-04	2.10E-02		1.1E+03		3.4E+04		1.1E+07		1.1E+03		1.1E+03		2.8E+04		2.5E+07		9.9E+02	
VOC	1,1,1-Trichloroethane	71-55-6	D	8	6	4.50E-03	1.80E+00	4.30E-04	5.00E-04		4.6E+02	3.9E-03	4.5E+03	4.0E-04	2.9E+07	6.2E-08	4.6E+02	3.9E-03	2.5E+02	7.2E-03	3.8E+03	4.7E-04	6.7E+07	2.7E-08	4.6E+02	3.9E-03
VOC	1,1,2-Trichloroethane	79-00-5	C	8				3.60E-04	3.10E-02		2.4E+01		5.7E+01		2.5E+05		8.4E+02		4.6E+00		1.7E+01		1.9E+05		1.8E+02	
VOC	Trichloroethene	79-01-6	C-B2	8	2	2.80E-03	5.50E-02	6.50E-04	3.30E-02		3.7E+01	1.5E-03	2.6E+02	2.1E-04	2.3E+06	2.4E-08	5.0E+02	1.1E-04	7.1E+00	7.7E-03	7.8E+01	7.1E-04	1.8E+06	3.1E-08	5.0E+02	1.1E-04
VOC	Trichlorofluoromethane	75-69-4		8				3.90E-04	3.60E-02		5.6E+02		1.1E+05		1.7E+09		5.6E+02		5.6E+02		9.2E+04		3.8E+09		5.6E+02	
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		8				9.70E-04	7.10E-02		5.5E+02		2.1E+05		2.3E+09		5.5E+02		5.5E+02		1.8E+05		5.1E+09		5.5E+02	
VOC	Vinyl Chloride	75-01-4	A	8				4.70E-04	2.10E-02		2.8E+00		2.9E+01		8.9E+05		3.4E+01		2.7E-01		4.2E+00		3.5E+05		3.8E+00	
VOC	Xylenes (total)	1330-20-7	ID	8	2	2.80E+00	3.50E+00	1.20E-03	1.90E-02		1.5E+02	2.3E-02	5.4E+04	6.5E-05	1.3E+08	2.7E-08	1.5E+02	2.3E-02	1.5E+02	2.3E-02	4.6E+04	7.6E-05	2.9E+08	1.2E-08	1.5E+02	2.3E-02
SVOC	Acenaphthene	83-32-9		8				2.00E-02	7.50E-02		3.5E+05		9.7E+04		6.2E+06		1.3E+05		1.9E+05		8.1E+04		1.4E+07		4.1E+04	
SVOC	Acenaphthylene	208-96-8	D	8				2.00E-02	6.90E-02		3.0E+03		2.7E+03		1.0E+06		5.2E+03		1.6E+03		2.2E+03		2.3E+06		1.6E+03	
SVOC	Acetophenone	98-86-2	D	8				1.90E-02	7.40E-02		1.1E+03		5.2E+04		1.4E+07		1.1E+03		1.1E+03		4.4E+04		3.3E+07		1.1E+03	
SVOC	Anthracene	120-12-7	D	8	1	6.70E-02	6.70E-02																			

TABLE 4-2
GENERAL MOTORS CORPORATION
PONTIAC NORTH CAMPUS - PONTIAC, MICHIGAN

RCRA FACILITY INVESTIGATION

DATA SUMMARY FOR AOI F-07 (SOIL)

Chem Group	Chemical	CASRN	Carc Class	No of Analyses	No of Detects	Min Detected (mg/kg)	Max Detected (mg/kg)	Min QL (mg/kg)	Max QL (mg/kg)	Site Specific Background (mg/kg)	Industrial Soil Volatilization to Indoor Air Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Soil Volatilization to Indoor Air Inhalation Criteria	Industrial Infinite Source Volatile Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Infinite Source Volatile Soil Inhalation Criteria	Industrial Particulate Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Particulate Soil Inhalation Criteria	Industrial Direct Contact Criteria (mg/kg)	Ratio of Max Detect to Industrial Direct Contact Criteria	Residential Soil Volatilization to Indoor Air Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Soil Volatilization to Indoor Air Inhalation Criteria	Residential Infinite Source Volatile Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Infinite Source Volatile Soil Inhalation Criteria	Residential Particulate Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Particulate Soil Inhalation Criteria	Residential Direct Contact Criteria (mg/kg)	Ratio of Max Detect to Residential Direct Contact Criteria
SVOC	Dimethylphthalate	131-11-3	D	8				2.00E-02	2.40E-01						1.5E+06		7.9E+02						3.3E+06		7.9E+02	
SVOC	Di-n-butylphthalate	84-74-2	D	8				2.40E-02	2.20E-01						1.5E+06		7.6E+02						3.3E+06		7.6E+02	
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		6				1.60E-01	2.40E-01								2.6E+02								7.9E+01	
SVOC	2,4-Dinitrophenol	51-28-5		6				1.10E-01	1.60E-01																	
SVOC	2,4-Dinitrotoluene	121-14-2	B2	8				1.90E-02	6.80E-02						2.0E+04		2.2E+02						1.6E+04		4.8E+01	
SVOC	2,6-Dinitrotoluene	606-20-2	B2	8				1.90E-02	7.10E-02																	
SVOC	Di-n-octylphthalate	117-84-0		8				1.90E-02	8.00E-02								2.0E+04								6.9E+03	
SVOC	Fluoranthene	206-44-0	D	8	2	6.20E-01	7.00E-01	2.40E-02	7.10E-02		1.0E+06	7.0E-07	8.9E+05	7.9E-07	4.1E+06	1.7E-07	1.3E+05	5.4E-06	1.0E+06	7.0E-07	7.4E+05	9.5E-07	9.3E+06	7.5E-08	2.7E+04	1.5E-05
SVOC	Fluorene	86-73-7	D	8				2.10E-02	7.10E-02		1.0E+06		1.5E+05		4.1E+06		8.7E+04		5.8E+05		1.3E+05		9.3E+06		2.7E+04	
SVOC	Hexachlorobenzene	118-74-1	B2	8				1.90E-02	8.30E-02			2.2E+02	5.6E+01		8.5E+03		3.7E+01		4.1E+01		1.7E+01		6.8E+03		8.9E+00	
SVOC	Hexachlorobutadiene	87-68-3	C	8				1.80E-02	6.60E-02			3.5E+02	4.6E+02		1.8E+05		4.6E+02		1.3E+02		1.3E+02		1.4E+05		1.0E+02	
SVOC	Hexachlorocyclopentadiene	77-47-4	E	8				1.60E-02	8.90E-02			5.6E+01	6.0E+01		5.9E+03		7.2E+02		3.0E+01		5.0E+01		1.3E+04		7.2E+02	
SVOC	Hexachloroethane	67-72-1	C	6				4.90E-02	7.10E-02			7.9E+01	6.6E+02		1.0E+05		7.3E+02		4.0E+01		5.5E+02		2.3E+05		2.3E+02	
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	8	2	1.90E-01	2.30E-01	2.30E-02	8.90E-02								8.0E+01	2.9E-03							2.0E+01	1.2E-02
SVOC	Isophorone	78-59-1	C	8				2.00E-02	6.50E-02						8.2E+06		2.4E+03						1.2E+07		2.4E+03	
SVOC	2-Methylnaphthalene	91-57-6	ID	8	2	2.40E-01	1.20E+00	1.90E-02	6.10E-02								2.6E+04	4.6E-05							8.1E+03	1.5E-04
SVOC	Methylphenol (total)	1319-77-3		8				1.60E-02	6.90E-02						2.9E+06		3.6E+04						6.7E+06		1.1E+04	
SVOC	Naphthalene	91-20-3	C	6	2	1.40E-01	8.30E-01	5.00E-02	6.30E-02		4.7E+02	1.8E-03	3.5E+02	2.4E-03	8.8E+04	9.4E-06	5.2E+04	1.6E-05	2.5E+02	3.3E-03	3.0E+02	2.8E-03	2.0E+05	4.2E-06	1.6E+04	5.2E-05
SVOC	2-Nitroaniline	88-74-4		8				2.00E-02	6.80E-02																	
SVOC	3-Nitroaniline	99-09-2	C	8				1.30E-02	2.10E-01																	
SVOC	4-Nitroaniline	100-01-6	C	8				1.90E-02	1.00E-01																	
SVOC	Nitrobenzene	98-95-3	D	8				1.90E-02	6.80E-02		1.7E+02		6.4E+01		2.1E+04		3.4E+02		9.1E+01		5.4E+01		4.7E+04		1.0E+02	
SVOC	2-Nitrophenol	88-75-5		8				1.70E-02	6.80E-02								2.0E+03								6.3E+02	
SVOC	4-Nitrophenol	100-02-7		8				1.20E-01	2.80E-01																	
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	8				2.10E-02	7.20E-02								7.8E+03								1.7E+03	
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	8				2.00E-02	6.50E-02						2.0E+03		5.4E+00						1.6E+03		1.2E+00	
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	8				2.00E-02	7.70E-02																	
SVOC	Pentachlorophenol	87-86-5	B2	8				9.10E-02	1.80E-01						1.3E+05		3.2E+02						1.0E+05		9.0E+01	
SVOC	Phenanthrene	85-01-8	D	8	2	3.90E-01	7.40E-01	2.10E-02	6.60E-02		5.1E+03	1.5E-04	1.9E+02	3.9E-03	2.9E+03	2.6E-04	5.2E+03	1.4E-04	2.8E+03	2.6E-04	1.6E+02	4.6E-03	6.7E+03	1.1E-04	1.6E+03	4.6E-04
SVOC	Phenol	108-95-2	ID	8				1.90E-02	7.20E-02						1.8E+07		1.2E+04						4.0E+07		1.2E+04	
SVOC	Pyrene	129-00-0	D	8	2	5.20E-01	5.60E-01	1.80E-02	6.50E-02		1.0E+06	5.6E-07	7.8E+05	7.2E-07	2.9E+06	1.9E-07	8.4E+04	6.7E-06	1.0E+06	5.6E-07	6.5E+05	8.6E-07	6.7E+06	8.4E-08	2.9E+04	1.9E-05
SVOC	2,4,5-Trichlorophenol	95-95-4		8				2.20E-02	8.10E-02						1.0E+07		7.3E+04						2.3E+07		2.3E+04	
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	8				1.80E-02	9.30E-02						1.3E+06		3.3E+03						1.0E+06		7.1E+02	
P/PCB	PCBs (total)	1336-36-3	B2	8	2	1.74E+00	1.85E+00	3.00E-03	2.60E-02		1.6E+04	1.2E-04	8.1E+02	2.3E-03	6.5E+03	2.9E-04	1.6E+01	1.2E-01	3.0E+03	6.2E-04	2.4E+02	7.7E-03	5.2E+03	3.6E-04	4.0E+00	4.6E-01
INORG	Antimony	7440-36-0		8	3	4.34E-01	3.08E+00	1.21E-01	6.26E-01						5.9E+03	5.2E-04	6.7E+02	4.6E-03					1.3E+04	2.4E-04	1.8E+02	1.7E-02
INORG	Arsenic	7440-38-2	A	8	8	1.01E+00	3.94E+01			1.3E+01					9.1E+02	2.9E-02	3.7E+01	7.1E-01					7.2E+02	3.6E-02	7.6E+00	3.4E+00
INORG	Barium	7440-39-3	D	8	8	6.82E+00	2.05E+02			1.1E+02					1.5E+05	6.3E-04	1.3E+05	7.3E-04					3.3E+05	2.9E-04	3.7E+04	2.6E-03
INORG	Beryllium	7440-41-7	B1	8	4	6.49E-02	9.95E-01	3.56E-02	5.87E-02	1.5E+00					5.9E+02		1.6E+03						1.3E+03		4.1E+02	
INORG	Cadmium	7440-43-9	B1	8	6	9.36E-02	4.12E-01	8.40E-03	9.30E-03	1.2E+00					2.2E+03		2.1E+03						1.7E+03		5.5E+02	
INORG	Chromium (total)	7440-47-3		8	8	4.64E+00	3.35E+02			4.9E+01					2.4E+02	1.2E+00	9.2E+03	3.1E-02					2.6E+02	1.1E+00	2.5E+03	1.1E-01
INORG	Cobalt	7440-48-4	B1	8	8	2.21E+00	7.97E+00			1.7E+01					5.9E+03		9.0E+03						1.3E+04		2.6E+03	
INORG	Copper	7440-50-8	D	8	8	4.18E+00	3.91E+01			3.2E+01					5.9E+04	1.2E-04	7.3E+04	9.7E-05					1.3E+05	5.5E-05	2.0E+04	3.6E-04
INORG	Lead	7439-92-1	B2	8	8	2.60E+00	4.96E+02			4.9E+01					4.4E+04	1.0E-02	9.0E+02	5.0E-01					1.0E+05	4.5E-03	4.0E+02	1.1E+00
INORG	Manganese	7439-96-5	D	8	8	1.01E+02	3.03E+02			5.1E+02					1.5E+03		9.0E+04						3.3E+03		2.5E+04	
INORG	Mercury	7439-97-6	D	8	2	2.93E-01	3.02E-01	8.70E-03	1.86E-02	1.3E-01	8.9E+01	1.9E-03	6.2E+01	2.8E-03	8.8E+03	2.0E-05	5.8E+02	3.0E-04	4.8E+01	3.6E-03	5.2E+01	3.3E-03	2.0E+04	8.6E-06	1.6E+02	1.1E-03
INORG	Nickel	7440-02-0	A	8	8	5.55E+00	1.34E+02			3.0E+01					1.6E+04	6.5E-03	1.5E+05	6.9E-04					1.3E+04	8.0E-03	4.0E+04	2.6E-03
INORG	Selenium	7782-49-2	D	8	3	5.11E-01	1.05E+01	2.25E-01	3.45E-01	4.1E-01					5.9E+04	1.7E-04	9.6E+03	1.1E-03					1.3E+05	7.8E-05	2.6E+03	3.9E-03
INORG	Silver	7440-22-4	D	8				5.24E-02	2.21E-01						2.9E+03		9.0E+03						6.7E+03		2.5E+03	
INORG	Thallium	7440-28-0		8	3	3.79E-01	1.14E+00	5.15E-01	6.38E-01								1.3E+02	8.8E-03							3.5E+01	3.3E-02
INORG	Vanadium	7440-62-2		8	8	4.89E+00	2.15E+01			3.3E+01							5.5E+03								7.5E+02	
INORG	Zinc	7440-66-6	D	8	8	1.25E+01	1.19E+02			1.9E+02							6.3E+05								1.7E+05	

Notes:

Screening Criteria is from Michigan DEQ Act 451, Part 201.
The Screening Criteria for Pyrene were used as surrogates for Phenanthrene and Benzo(g,h,i)perylene.
The Screening Criteria for Naphthalene were used as surrogates for 2-Methylnaphthalene.
The Screening Criteria for Chromium VI was used as a surrogate for Chromium (total).
The concentrations for the Methylphenol (2, 3, & 4) were summed before comparing to the Screening Criteria for 4-Methylphenol.
The concentrations for all PCB isomers were summed before comparing to the Screening Criteria.
The concentrations for the Xylene isomers (m/p and o) were summed before comparing to the Screening Criteria.
The concentrations for the 1,3-Dichloropropene isomers (cis and trans) were summed before comparing to the Screening Criteria.

Chem Group - Chemical Group
Carc Class - EPA Weight-of-Evidence Cancer Classification
Min QL - Minimum Quantitation Limit
Max QL - Maximum Quantitation Limit

TABLE 4-3
GENERAL MOTORS CORPORATION
PONTIAC NORTH CAMPUS - PONTIAC, MICHIGAN

RCRA FACILITY INVESTIGATION

DATA SUMMARY FOR AOI F-07 (SHALLOW GROUNDWATER)

Wellzone	Chem Group	Chemical	CASRN	Meas Basis	Carc Class	No of Analyses	No of Detects	Min Detected (mg/L)	Max Detected (mg/L)	Min QL (mg/L)	Max QL (mg/L)	Industrial GW Volatilization to Indoor Air (mg/L)	Ratio of Max Detect to Industrial GW Volatilization to Indoor Air	Groundwater Contact Criteria (mg/L)	Ratio of Max Detect to Groundwater Contact Criteria	Residential Drinking Water Criteria (mg/L)	Ratio of Max Detected to Residential Drinking Water Criteria
Shallow	VOC	Acetone	67-64-1	T	ID	4				5.10E-04	1.00E-02	1.0E+06		3.1E+04		7.3E-01	
Shallow	VOC	Benzene	71-43-2	T	A	4				1.60E-04	1.00E-03	3.5E+01		1.1E+01		5.0E-03	
Shallow	VOC	Bromodichloromethane	75-27-4	T	B2	4	2	2.00E-03	2.20E-03	1.70E-04	1.00E-03	3.7E+01	5.9E-05	1.4E+01	1.6E-04	1.0E-01	2.2E-02
Shallow	VOC	Bromoform	75-25-2	T	B2	4				1.80E-04	1.00E-03	3.1E+03		1.4E+02		1.0E-01	
Shallow	VOC	Bromomethane	74-83-9	T	D	4				2.00E-04	1.00E-03	9.0E+00		7.0E+01		1.0E-02	
Shallow	VOC	2-Butanone	78-93-3	T	ID	4				4.10E-04	1.00E-02	2.4E+05		2.4E+05		1.3E+01	
Shallow	VOC	Carbon Disulfide	75-15-0	T		4	1	4.70E-04	4.70E-04	2.00E-04	1.00E-03	5.5E+02	8.5E-07	1.2E+03	3.9E-07	8.0E-01	5.9E-04
Shallow	VOC	Carbon Tetrachloride	56-23-5	T	B2	4				1.20E-04	1.00E-03	2.4E+00		4.6E+00		5.0E-03	
Shallow	VOC	Chlorobenzene	108-90-7	T	D	4				1.40E-04	1.00E-03	4.7E+02		8.6E+01		1.0E-01	
Shallow	VOC	Chloroethane	75-00-3	T		4	2	3.30E-03	4.70E-03	2.60E-04	1.00E-03	5.7E+03	8.2E-07	4.4E+02	1.1E-05	4.3E-01	1.1E-02
Shallow	VOC	Chloroform	67-66-3	T	B2	4	3	2.90E-04	9.50E-03	1.40E-04	1.40E-04	1.8E+02	5.3E-05	1.5E+02	6.3E-05	1.0E-01	9.5E-02
Shallow	VOC	Chloromethane	74-87-3	T	D	4	1	2.80E-04	2.80E-04	1.30E-04	1.00E-03	4.5E+01	6.2E-06	4.9E+02	5.7E-07	2.6E-01	1.1E-03
Shallow	VOC	Cumene	98-82-8	T	D	4				1.20E-04	1.00E-03	5.6E+01		5.6E+01		8.0E-01	
Shallow	VOC	Cyclohexane	110-82-7	T	ID	4				1.30E-04	1.00E-03						
Shallow	VOC	1,2-Dibromo-3-chloropropane	96-12-8	T	B2	4				6.20E-04	2.00E-03	1.2E+00		3.9E-01		2.0E-04	
Shallow	VOC	Dibromochloromethane	124-48-1	T	C	4				2.60E-04	1.00E-03	1.1E+02		1.8E+01		1.0E-01	
Shallow	VOC	1,2-Dibromoethane	106-93-4	T	B2	4				2.20E-04	1.00E-03	1.5E+01		2.5E-02		1.0E-03	
Shallow	VOC	1,2-Dichlorobenzene	95-50-1	T	D	4				1.10E-04	1.00E-03	1.6E+02		1.6E+02		6.0E-01	
Shallow	VOC	1,3-Dichlorobenzene	541-73-1	T	D	4				1.50E-04	1.00E-03			2.0E+00		6.6E-03	
Shallow	VOC	1,4-Dichlorobenzene	106-46-7	T	C	4				1.70E-04	1.00E-03	7.4E+01		6.4E+00		7.5E-02	
Shallow	VOC	Dichlorodifluoromethane	75-71-8	T		4				2.60E-04	2.00E-03	3.0E+02		3.0E+02		1.7E+00	
Shallow	VOC	1,1-Dichloroethane	75-34-3	T	C	4	4	6.00E-03	2.30E-02			2.3E+03	1.0E-05	2.4E+03	9.6E-06	8.8E-01	2.6E-02
Shallow	VOC	1,2-Dichloroethane	107-06-2	T	B2	4				2.10E-04	1.00E-03	5.9E+01		1.9E+01		5.0E-03	
Shallow	VOC	1,1-Dichloroethene	75-35-4	T	C	7	6	1.10E-03	2.00E-02	2.20E-04	2.20E-04	1.3E+00	1.5E-02	1.1E+01	1.8E-03	7.0E-03	2.9E+00
Shallow	VOC	cis-1,2-Dichloroethene	156-59-2	T	D	4	4	2.30E-04	5.60E-04			2.1E+02	2.7E-06	2.0E+02	2.8E-06	7.0E-02	8.0E-03
Shallow	VOC	trans-1,2-Dichloroethene	156-60-5	T		4				1.50E-04	5.00E-04	2.0E+02		2.2E+02		1.0E-01	
Shallow	VOC	1,2-Dichloropropane	78-87-5	T	B2	4				1.70E-04	1.00E-03	3.6E+01		1.6E+01		5.0E-03	
Shallow	VOC	1,3-Dichloropropene (total)	542-75-6	T	B2	4				2.70E-04	1.00E-03	2.6E+01		5.5E+00		8.5E-03	
Shallow	VOC	Ethyl Benzene	100-41-4	T	D	4				1.20E-04	1.00E-03	1.7E+02		1.7E+02		7.0E-01	
Shallow	VOC	2-Hexanone	591-78-6	T		4				4.60E-04	1.00E-02	8.7E+03		5.2E+03		1.0E+00	
Shallow	VOC	Methyl Acetate	79-20-9	T		4				4.10E-04	1.00E-02						
Shallow	VOC	Methyl tert-butyl ether	1634-04-4	T		4				1.30E-04	5.00E-03	4.7E+04		6.1E+02		2.4E-01	
Shallow	VOC	4-Methyl-2-pentanone	108-10-1	T	ID	4				2.30E-04	1.00E-02	2.0E+04		1.3E+04		1.8E+00	
Shallow	VOC	Methylcyclohexane	108-87-2	T		4				1.50E-04	1.00E-03						
Shallow	VOC	Methylene Chloride	75-09-2	T	B2	4				3.40E-04	1.00E-03	1.4E+03		2.2E+02		5.0E-03	
Shallow	VOC	Styrene	100-42-5	T		4				1.50E-04	1.00E-03	3.1E+02		9.7E+00		1.0E-01	
Shallow	VOC	1,1,2,2-Tetrachloroethane	79-34-5	T	C	4				2.50E-04	1.00E-03	7.7E+01		4.7E+00		8.5E-03	
Shallow	VOC	Tetrachloroethene	127-18-4	T	C-B2	7	6	5.60E-04	6.30E-03	1.20E-04	1.20E-04	1.7E+02	3.7E-05	1.2E+01	5.3E-04	5.0E-03	1.3E+00
Shallow	VOC	Toluene	108-88-3	T	D	4	3	2.00E-04	2.60E-04	1.80E-04	1.80E-04	5.3E+02	4.9E-07	5.3E+02	4.9E-07	1.0E+00	2.6E-04
Shallow	VOC	1,2,4-Trichlorobenzene	120-82-1	T	D	4				1.70E-04	1.00E-03	3.0E+02		1.9E+01		7.0E-02	
Shallow	VOC	1,1,1-Trichloroethane	71-55-6	T	D	4	4	6.30E-03	1.00E-02			1.3E+03	7.7E-06	1.3E+03	7.7E-06	2.0E-01	5.0E-02
Shallow	VOC	1,1,2-Trichloroethane	79-00-5	T	C	4				3.00E-04	1.00E-03	1.1E+02		2.1E+01		5.0E-03	
Shallow	VOC	Trichloroethene	79-01-6	T	C-B2	4	2	3.90E-04	4.20E-04	1.40E-04	1.00E-03	9.7E+01	4.3E-06	2.2E+01	1.9E-05	5.0E-03	8.4E-02
Shallow	VOC	Trichlorofluoromethane	75-69-4	T		4				2.80E-04	1.00E-03	1.1E+03		1.1E+03		2.6E+00	
Shallow	VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	T		4				3.20E-04	1.00E-03	1.7E+02		1.7E+02		1.7E+02	
Shallow	VOC	Vinyl Chloride	75-01-4	T	A	4				1.50E-04	1.00E-03	1.3E+01		1.0E+00		2.0E-03	
Shallow	VOC	Xylenes (total)	1330-20-7	T	ID	4				3.30E-04	1.00E-03	1.9E+02		1.9E+02		1.0E+01	
Shallow	SVOC	Acenaphthene	83-32-9	T		4				8.00E-04	5.00E-03	4.2E+00		4.2E+00		1.3E+00	
Shallow	SVOC	Acenaphthylene	208-96-8	T	D	4				7.10E-04	5.00E-03	3.9E+00		3.9E+00		5.2E-02	
Shallow	SVOC	Acetophenone	98-86-2	T	D	4				2.60E-03	1.00E-02	6.1E+03		6.1E+03		1.5E+00	
Shallow	SVOC	Anthracene	120-12-7	T	D	4				6.80E-04	5.00E-03	4.3E-02		4.3E-02		4.3E-02	
Shallow	SVOC	Atrazine	1912-24-9	T		4				2.50E-03	5.00E-03			5.4E+00		3.0E-03	
Shallow	SVOC	Benzaldehyde	100-52-7	T		4				2.80E-03	1.00E-02						
Shallow	SVOC	Benzo(a)anthracene	56-55-3	T	B2	4				7.00E-04	5.00E-03			9.4E-03		2.1E-03	
Shallow	SVOC	Benzo(a)pyrene	50-32-8	T	B2	4				7.30E-04	5.00E-03			2.0E-03		5.0E-03	

TABLE 4-3
GENERAL MOTORS CORPORATION
PONTIAC NORTH CAMPUS - PONTIAC, MICHIGAN

RCRA FACILITY INVESTIGATION

DATA SUMMARY FOR AOI F-07 (SHALLOW GROUNDWATER)

Wellzone	Chem Group	Chemical	CASRN	Meas Basis	Carc Class	No of Analyses	No of Detects	Min Detected (mg/L)	Max Detected (mg/L)	Min QL (mg/L)	Max QL (mg/L)	Industrial GW Volatilization to Indoor Air (mg/L)	Ratio of Max Detect to Industrial GW Volatilization to Indoor Air	Groundwater Contact Criteria (mg/L)	Ratio of Max Detect to Groundwater Contact Criteria	Residential Drinking Water Criteria (mg/L)	Ratio of Max Detected to Residential Drinking Water Criteria
Shallow	SVOC	Benzo(b)fluoranthene	205-99-2	T	B2	4				9.40E-04	5.00E-03			2.0E-03		2.0E-03	
Shallow	SVOC	Benzo(g,h,i)perylene	191-24-2	T	D	4				8.50E-04	5.00E-03			5.0E-03		5.0E-03	
Shallow	SVOC	Benzo(k)fluoranthene	207-08-9	T	B2	4				8.40E-04	5.00E-03			5.0E-03		5.0E-03	
Shallow	SVOC	Biphenyl	92-52-4	T	D	4				2.60E-03	1.00E-02						
Shallow	SVOC	bis(2-Chloroethoxy)methane	111-91-1	T	D	4				8.70E-04	5.00E-03						
Shallow	SVOC	bis(2-Chloroethyl) ether	111-44-4	T	B2	4				9.70E-04	5.00E-03	2.1E+02		5.7E+00		2.0E-03	
Shallow	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	T	B2	4				2.70E-03	5.00E-03			3.2E-01		6.0E-03	
Shallow	SVOC	4-Bromophenyl-phenyl ether	101-55-3	T	D	4				8.80E-04	5.00E-03						
Shallow	SVOC	Butylbenzylphthalate	85-68-7	T	C	4				8.80E-04	5.00E-03			2.7E+00		1.2E+00	
Shallow	SVOC	Caprolactam	105-60-2	T		4	1	4.10E-03	4.10E-03	2.50E-03	1.00E-02			3.9E+05	1.1E-08	5.8E+00	7.1E-04
Shallow	SVOC	Carbazole	86-74-8	T	B2	4				8.20E-04	1.00E-02			7.4E+00		8.5E-02	
Shallow	SVOC	4-Chloro-3-methylphenol	59-50-7	T		4				9.90E-04	5.00E-03			7.9E+01		1.5E-01	
Shallow	SVOC	4-Chloroaniline	106-47-8	T		4				6.10E-04	1.00E-02						
Shallow	SVOC	2-Chloronaphthalene	91-58-7	T		4				8.50E-04	5.00E-03			6.7E+00		1.8E+00	
Shallow	SVOC	2-Chlorophenol	95-57-8	T		4				1.00E-03	5.00E-03			9.4E+01		4.5E-02	
Shallow	SVOC	4-Chlorophenyl-phenyl ether	7005-72-3	T		4				7.90E-04	5.00E-03						
Shallow	SVOC	Chrysene	218-01-9	T	B2	4				7.50E-04	5.00E-03			5.0E-03		5.0E-03	
Shallow	SVOC	Dibenz(a,h)anthracene	53-70-3	T	B2	4				7.90E-04	5.00E-03			2.0E-03		2.0E-03	
Shallow	SVOC	Dibenzofuran	132-64-9	T	D	4				1.10E-03	5.00E-03						
Shallow	SVOC	3,3'-Dichlorobenzidine	91-94-1	T	B2	4				9.30E-04	2.00E-02			1.8E-01		1.1E-03	
Shallow	SVOC	2,4-Dichlorophenol	120-83-2	T		4				8.50E-04	1.00E-02			4.8E+01		7.3E-02	
Shallow	SVOC	Diethylphthalate	84-66-2	T	D	4				6.50E-04	5.00E-03			1.1E+03		5.5E+00	
Shallow	SVOC	2,4-Dimethylphenol	105-67-9	T		4				8.50E-04	5.00E-03			5.2E+02		3.7E-01	
Shallow	SVOC	Dimethylphthalate	131-11-3	T	D	4				7.60E-04	5.00E-03			4.2E+03		7.3E+01	
Shallow	SVOC	Di-n-butylphthalate	84-74-2	T	D	4				6.70E-04	5.00E-03			1.1E+01		8.8E-01	
Shallow	SVOC	4,6-Dinitro-2-methylphenol	534-52-1	T		4				1.30E-03	2.00E-02			9.5E+00		2.0E-02	
Shallow	SVOC	2,4-Dinitrophenol	51-28-5	T		4				3.00E-03	2.00E-02						
Shallow	SVOC	2,4-Dinitrotoluene	121-14-2	T	B2	4				7.90E-04	5.00E-03			8.6E+00		7.7E-03	
Shallow	SVOC	2,6-Dinitrotoluene	606-20-2	T	B2	4				5.70E-04	5.00E-03						
Shallow	SVOC	Di-n-octylphthalate	117-84-0	T		4				1.10E-03	5.00E-03			4.0E-01		1.3E-01	
Shallow	SVOC	Fluoranthene	206-44-0	T	D	4				8.10E-04	5.00E-03	2.1E-01		2.1E-01		2.1E-01	
Shallow	SVOC	Fluorene	86-73-7	T	D	4				1.00E-03	5.00E-03	2.0E+00		2.0E+00		8.8E-01	
Shallow	SVOC	Hexachlorobenzene	118-74-1	T	B2	4				7.40E-04	5.00E-03	3.0E+00		4.6E-03		1.0E-03	
Shallow	SVOC	Hexachlorobutadiene	87-68-3	T	C	4				7.30E-04	5.00E-03	3.2E+00		4.0E-01		1.5E-02	
Shallow	SVOC	Hexachlorocyclopentadiene	77-47-4	T	E	4				1.10E-03	5.00E-03	4.2E-01		1.6E+00		5.0E-02	
Shallow	SVOC	Hexachloroethane	67-72-1	T	C	4				7.40E-04	5.00E-03	5.0E+01		1.9E+00		7.3E-03	
Shallow	SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	T	B2	4				6.30E-04	5.00E-03			2.0E-03		2.0E-03	
Shallow	SVOC	Isophorone	78-59-1	T	C	4				6.30E-04	5.00E-03			9.9E+02		7.7E-01	
Shallow	SVOC	2-Methylnaphthalene	91-57-6	T	ID	4				6.40E-04	5.00E-03			2.5E+01		2.6E-01	
Shallow	SVOC	Methylphenol (total)	1319-77-3	T		4				1.30E-03	5.00E-03			8.1E+02		3.7E-01	
Shallow	SVOC	Naphthalene	91-20-3	T	C	4				7.50E-04	5.00E-03	3.1E+01		3.1E+01		5.2E-01	
Shallow	SVOC	2-Nitroaniline	88-74-4	T		4				7.00E-04	2.00E-02						
Shallow	SVOC	3-Nitroaniline	99-09-2	T	C	4				7.10E-04	2.00E-02						
Shallow	SVOC	4-Nitroaniline	100-01-6	T	C	4				1.30E-03	2.00E-02						
Shallow	SVOC	Nitrobenzene	98-95-3	T	D	4				8.10E-04	5.00E-03	5.5E+02		1.1E+01		3.4E-03	
Shallow	SVOC	2-Nitrophenol	88-75-5	T		4				2.10E-03	5.00E-03			7.9E+01		2.0E-02	
Shallow	SVOC	4-Nitrophenol	100-02-7	T		4				1.90E-03	2.00E-02						
Shallow	SVOC	N-Nitrosodiphenylamine	86-30-6	T	B2	4				1.40E-03	5.00E-03			3.5E+01		2.7E-01	
Shallow	SVOC	N-Nitroso-di-n-propylamine	621-64-7	T	B2	4				6.70E-04	5.00E-03			3.6E-01		5.0E-03	
Shallow	SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	T	C	4				7.80E-04	5.00E-03						
Shallow	SVOC	Pentachlorophenol	87-86-5	T	B2	4				2.40E-03	5.00E-03			2.0E-01		1.0E-03	
Shallow	SVOC	Phenanthrene	85-01-8	T	D	4				8.20E-04	5.00E-03	1.0E+00		5.2E+00		1.0E-02	
Shallow	SVOC	Phenol	108-95-2	T	ID	4				2.60E-03	5.00E-03			2.9E+04		4.4E+00	
Shallow	SVOC	Pyrene	129-00-0	T	D	4				1.10E-03	5.00E-03	1.4E-01		1.4E-01		1.4E-01	
Shallow	SVOC	2,4,5-Trichlorophenol	95-95-4	T		4				1.20E-03	5.00E-03			1.7E+02		7.3E-01	

TABLE 4-3
GENERAL MOTORS CORPORATION
PONTIAC NORTH CAMPUS - PONTIAC, MICHIGAN

RCRA FACILITY INVESTIGATION

DATA SUMMARY FOR AOI F-07 (SHALLOW GROUNDWATER)

Wellzone	Chem Group	Chemical	CASRN	Meas Basis	Carc Class	No of Analyses	No of Detects	Min Detected (mg/L)	Max Detected (mg/L)	Min QL (mg/L)	Max QL (mg/L)	Industrial GW Volatilization to Indoor Air (mg/L)	Ratio of Max Detect to Industrial GW Volatilization to Indoor Air	Groundwater Contact Criteria (mg/L)	Ratio of Max Detect to Groundwater Contact Criteria	Residential Drinking Water Criteria (mg/L)	Ratio of Max Detected to Residential Drinking Water Criteria
Shallow	SVOC	2,4,6-Trichlorophenol	88-06-2	T	B2	4				1.70E-03	5.00E-03			1.0E+01		1.2E-01	
Shallow	P/PCB	PCBs (total)	1336-36-3	D	B2	2				4.00E-04	4.00E-04	4.5E-02		3.3E-03		5.0E-04	
Shallow	P/PCB	PCBs (total)	1336-36-3	T	B2	4				8.20E-05	4.00E-04	4.5E-02		3.3E-03		5.0E-04	
Shallow	INORG	Antimony	7440-36-0	D		4	1	3.00E-03	3.00E-03	2.20E-03	2.50E-02			6.8E+01	4.4E-05	6.0E-03	5.0E-01
Shallow	INORG	Antimony	7440-36-0	T		4				2.20E-03	2.50E-02			6.8E+01		6.0E-03	
Shallow	INORG	Arsenic	7440-38-2	D	A	4	2	1.24E-02	4.16E-02	3.90E-03	1.00E-02			4.3E+00	9.7E-03	5.0E-02	8.3E-01
Shallow	INORG	Arsenic	7440-38-2	T	A	4	2	2.36E-02	3.00E-02	3.90E-03	1.00E-02			4.3E+00	7.0E-03	5.0E-02	6.0E-01
Shallow	INORG	Barium	7440-39-3	D	D	4	4	1.85E-02	6.46E-02					1.4E+04	4.6E-06	2.0E+00	3.2E-02
Shallow	INORG	Barium	7440-39-3	T	D	4	4	1.73E-02	5.72E-02					1.4E+04	4.1E-06	2.0E+00	2.9E-02
Shallow	INORG	Beryllium	7440-41-7	D	B1	4				5.40E-04	1.00E-03			2.9E+02		4.0E-03	
Shallow	INORG	Beryllium	7440-41-7	T	B1	4				5.40E-04	1.00E-03			2.9E+02		4.0E-03	
Shallow	INORG	Cadmium	7440-43-9	D	B1	4				2.80E-04	5.00E-03			1.9E+02		5.0E-03	
Shallow	INORG	Cadmium	7440-43-9	T	B1	4	1	3.80E-04	3.80E-04	2.80E-04	5.00E-03			1.9E+02	2.0E-06	5.0E-03	7.6E-02
Shallow	INORG	Chromium (total)	7440-47-3	D		4				1.40E-03	1.00E-02			4.6E+02		1.0E-01	
Shallow	INORG	Chromium (total)	7440-47-3	T		4	2	1.50E-03	2.90E-03	1.40E-03	1.00E-02			4.6E+02	6.3E-06	1.0E-01	2.9E-02
Shallow	INORG	Cobalt	7440-48-4	D	B1	4				1.30E-03	2.00E-02			2.4E+03		4.0E-02	
Shallow	INORG	Cobalt	7440-48-4	T	B1	4				1.30E-03	2.00E-02			2.4E+03		4.0E-02	
Shallow	INORG	Copper	7440-50-8	D	D	4	1	1.54E-02	1.54E-02	4.20E-03	5.00E-03			7.4E+03	2.1E-06	1.4E+00	1.1E-02
Shallow	INORG	Copper	7440-50-8	T	D	4	1	1.79E-02	1.79E-02	4.20E-03	5.00E-03			7.4E+03	2.4E-06	1.4E+00	1.3E-02
Shallow	INORG	Lead	7439-92-1	D	B2	4				2.50E-03	3.00E-03					4.0E-03	
Shallow	INORG	Lead	7439-92-1	T	B2	4	1	3.00E-03	3.00E-03	2.50E-03	3.00E-03					4.0E-03	7.5E-01
Shallow	INORG	Manganese	7439-96-5	D	D	4	4	1.10E-03	2.69E-01					9.1E+03	3.0E-05	8.6E-01	3.1E-01
Shallow	INORG	Manganese	7439-96-5	T	D	4	4	1.50E-03	2.34E-01					9.1E+03	2.6E-05	8.6E-01	2.7E-01
Shallow	INORG	Mercury	7439-97-6	D	D	4				6.90E-05	2.00E-04	5.6E-02		5.6E-02		2.0E-03	
Shallow	INORG	Mercury	7439-97-6	T	D	4	1	1.70E-04	1.70E-04	6.90E-05	2.00E-04	5.6E-02	3.0E-03	5.6E-02	3.0E-03	2.0E-03	8.5E-02
Shallow	INORG	Nickel	7440-02-0	D	A	4	2	2.70E-03	3.60E-03	2.20E-03	2.00E-02			7.4E+04	4.9E-08	1.0E-01	3.6E-02
Shallow	INORG	Nickel	7440-02-0	T	A	4	2	4.10E-03	4.90E-03	2.20E-03	2.00E-02			7.4E+04	6.6E-08	1.0E-01	4.9E-02
Shallow	INORG	Selenium	7782-49-2	D	D	4				4.50E-03	5.00E-03			9.7E+02		5.0E-02	
Shallow	INORG	Selenium	7782-49-2	T	D	4				4.50E-03	5.00E-03			9.7E+02		5.0E-02	
Shallow	INORG	Silver	7440-22-4	D	D	4				1.50E-03	5.00E-03			1.5E+03		3.4E-02	
Shallow	INORG	Silver	7440-22-4	T	D	4				1.50E-03	5.00E-03			1.5E+03		3.4E-02	
Shallow	INORG	Thallium	7440-28-0	D		4	1	2.50E-05	2.50E-05	1.80E-05	1.00E-02			1.3E+01	1.9E-06	2.0E-03	1.3E-02
Shallow	INORG	Thallium	7440-28-0	T		4	1	2.50E-05	2.50E-05	1.80E-05	1.00E-02			1.3E+01	1.9E-06	2.0E-03	1.3E-02
Shallow	INORG	Vanadium	7440-62-2	D		4	3	8.40E-04	2.47E-02	8.20E-04	8.20E-04			9.7E+02	2.5E-05	4.5E-03	5.5E+00
Shallow	INORG	Vanadium	7440-62-2	T		4	2	7.80E-03	1.71E-02	8.20E-04	1.00E-02			9.7E+02	1.8E-05	4.5E-03	3.8E+00
Shallow	INORG	Zinc	7440-66-6	D	D	4	2	1.58E-02	2.08E-02	1.20E-02	2.00E-02			1.1E+05	1.9E-07	2.4E+00	8.7E-03
Shallow	INORG	Zinc	7440-66-6	T	D	4	3	1.24E-02	1.69E-01	2.00E-02	2.00E-02			1.1E+05	1.5E-06	2.4E+00	7.0E-02

Notes:

Screening Criteria is from Michigan DEQ Act 451, Part 201.

The Screening Criteria for Pyrene were used as surrogates for Phenanthrene and Benzo(g,h,i)perylene.

The Screening Criteria for Naphthalene were used as surrogates for 2-Methylnaphthalene.

The Screening Criteria for Chromium VI was used as a surrogate for Chromium (total).

The concentrations for the Methylphenol (2, 3, & 4) were summed before comparing to the Screening Criteria for 4-Methylphenol.

The concentrations for all PCB isomers were summed before comparing to the Screening Criteria.

The concentrations for the Xylene isomers (m/p and o) were summed before comparing to the Screening Criteria.

The concentrations for the 1,3-Dichloropropene isomers (cis and trans) were summed before comparing to the Screening Criteria.

Chem Group - Chemical Group

Meas Basis - Measured Basis; T = Total, D = Dissolved

Carc Class - EPA Weight-of-Evidence Cancer Classification

Min QL - Minimum Quantitation Limit

Max QL - Maximum Quantitation Limit

TABLE 4-4
GENERAL MOTORS CORPORATION
PONTIAC NORTH CAMPUS - PONTIAC, MICHIGAN

RCRA FACILITY INVESTIGATION

DATA SUMMARY FOR AOI F-08 (SOIL)

Chem Group	Chemical	CASRN	Carc Class	No of Analyses	No of Detects	Min Detected (mg/kg)	Max Detected (mg/kg)	Min QL (mg/kg)	Max QL (mg/kg)	Site Specific Background (mg/kg)	Industrial Soil Volatilization to Indoor Air Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Soil Volatilization to Indoor Air Inhalation Criteria	Industrial Infinite Source Volatile Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Infinite Source Volatile Soil Inhalation Criteria	Industrial Particulate Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Particulate Soil Inhalation Criteria	Industrial Direct Contact Criteria (mg/kg)	Ratio of Max Detect to Industrial Direct Contact Criteria	Residential Soil Volatilization to Indoor Air Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Soil Volatilization to Indoor Air Inhalation Criteria	Residential Infinite Source Volatile Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Infinite Source Volatile Soil Inhalation Criteria	Residential Particulate Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Particulate Soil Inhalation Criteria	Residential Direct Contact Criteria (mg/kg)	Ratio of Max Detect to Residential Direct Contact Criteria
VOC	Acetone	67-64-1	ID	4	2	8.70E-03	9.50E-03	2.30E-02	2.50E-02		1.1E+05	8.6E-08	1.6E+05	5.9E-08	1.7E+08	5.6E-11	7.3E+04	1.3E-07	1.1E+05	8.6E-08	1.3E+05	7.3E-08	3.9E+08	2.4E-11	2.3E+04	4.1E-07
VOC	Benzene	71-43-2	A	4				7.10E-04	6.30E-03		8.4E+00		4.5E+01		4.7E+05		4.0E+02		1.6E+00		1.3E+01		3.8E+05		1.8E+02	
VOC	Bromodichloromethane	75-27-4	B2	4				1.30E-03	6.30E-03		6.4E+00		3.1E+01		1.1E+05		4.9E+02		1.2E+00		9.1E+00		8.4E+04		1.1E+02	
VOC	Bromoform	75-25-2	B2	4				1.80E-03	6.30E-03		7.7E+02		3.1E+03		3.6E+06		8.7E+02		1.5E+02		9.0E+02		2.8E+06		8.2E+02	
VOC	Bromomethane	74-83-9	D	4				2.00E-03	1.30E-02		1.6E+00		1.3E+01		1.5E+05		1.0E+03		8.6E-01		1.1E+01		3.3E+05		3.2E+02	
VOC	2-Butanone	78-93-3	ID	4	2	3.40E-03	3.60E-03	2.30E-02	2.50E-02		2.7E+04	1.3E-07	3.5E+04	1.0E-07	2.9E+07	1.2E-10	2.7E+04	1.3E-07	2.7E+04	1.3E-07	2.9E+04	1.2E-07	6.7E+07	5.4E-11	2.7E+04	1.3E-07
VOC	Carbon Disulfide	75-15-0		4				8.50E-04	6.30E-03		1.4E+02		1.6E+03		2.1E+07		2.8E+02		7.6E+01		1.3E+03		4.7E+07		2.8E+02	
VOC	Carbon Tetrachloride	56-23-5	B2	4				1.10E-03	6.30E-03		9.9E-01		1.2E+01		1.7E+05		3.9E+02		1.9E-01		3.5E+00		1.3E+05		9.6E+01	
VOC	Chlorobenzene	108-90-7	D	4				5.70E-04	6.30E-03		2.2E+02		9.2E+02		2.1E+06		2.6E+02		1.2E+02		7.7E+02		4.7E+06		2.6E+02	
VOC	Chloroethane	75-00-3		4				2.40E-03	1.30E-02		9.5E+02		3.6E+04		2.9E+08		9.5E+02		9.5E+02		3.0E+04		6.7E+08		9.5E+02	
VOC	Chloroform	67-66-3	B2	4				9.00E-04	6.30E-03		3.8E+01		1.5E+02		1.6E+06		1.5E+03		7.2E+00		4.5E+01		1.3E+06		1.2E+03	
VOC	Chloromethane	74-87-3	D	4				1.40E-03	1.30E-02		1.0E+01		1.1E+02		2.6E+06		1.1E+03		2.3E+00		4.0E+01		4.9E+06		1.1E+03	
VOC	Cumene	98-82-8	D	4				7.70E-04	6.30E-03		3.9E+02		2.0E+03		2.6E+06		3.9E+02		3.9E+02		1.7E+03		5.8E+06		3.9E+02	
VOC	Cyclohexane	110-82-7	ID	4				1.10E-03	1.30E-02																	
VOC	1,2-Dibromo-3-chloropropane	96-12-8	B2	4				1.80E-03	1.30E-02		1.2E+00		1.5E+01		5.9E+03		1.2E+00		1.2E+00		1.3E+01		1.3E+04		1.2E+00	
VOC	Dibromochloromethane	124-48-1	C	4				1.20E-03	6.30E-03		2.1E+01		8.0E+01		1.6E+05		5.0E+02		3.9E+00		2.4E+01		1.3E+05		1.1E+02	
VOC	1,2-Dibromoethane	106-93-4	B2	4				1.30E-03	6.30E-03		3.6E+00		5.8E+00		1.8E+04		4.3E-01		6.7E-01		1.7E+00		1.4E+04		2.5E-01	
VOC	1,2-Dichlorobenzene	95-50-1	D	4				7.80E-04	6.30E-03		2.1E+02		4.6E+04		4.4E+07		2.1E+02		2.1E+02		3.9E+04		1.0E+08		2.1E+02	
VOC	1,3-Dichlorobenzene	541-73-1	D	4				8.80E-04	6.30E-03								1.7E+02								1.7E+02	
VOC	1,4-Dichlorobenzene	106-46-7	C	4				7.30E-04	6.30E-03		1.0E+02		2.6E+02		5.7E+05		1.9E+03		1.9E+01		7.7E+01		4.5E+05		4.0E+02	
VOC	Dichlorodifluoromethane	75-71-8		4				1.20E-03	1.30E-02		1.7E+03		6.3E+04		1.5E+09		1.0E+03		9.0E+02		5.3E+04		3.3E+09		1.0E+03	
VOC	1,1-Dichloroethane	75-34-3	C	4				6.30E-04	6.30E-03		4.3E+02		2.5E+03		1.5E+07		8.9E+02		2.3E+02		2.1E+03		3.3E+07		8.9E+02	
VOC	1,2-Dichloroethane	107-06-2	B2	4				8.00E-04	6.30E-03		1.1E+01		2.1E+01		1.5E+05		4.2E+02		2.1E+00		6.2E+00		1.2E+05		9.1E+01	
VOC	1,1-Dichloroethene	75-35-4	C	4				1.30E-03	6.30E-03		3.3E-01		3.7E+00		7.8E+04		5.7E+02		6.2E-02		1.1E+00		6.2E+04		2.0E+02	
VOC	cis-1,2-Dichloroethene	156-59-2	D	4				9.20E-04	6.30E-03		4.1E+01		2.1E+02		1.0E+06		6.4E+02		2.2E+01		1.8E+02		2.3E+06		6.4E+02	
VOC	trans-1,2-Dichloroethene	156-60-5		4				8.00E-04	6.30E-03		4.3E+01		3.3E+02		2.1E+06		1.4E+03		2.3E+01		2.8E+02		4.7E+06		1.4E+03	
VOC	1,2-Dichloropropane	78-87-5	B2	4				8.20E-04	6.30E-03		7.4E+00		3.0E+01		1.2E+05		5.5E+02		4.0E+00		2.5E+01		2.7E+05		1.4E+02	
VOC	1,3-Dichloropropene (total)	542-75-6	B2	4				9.40E-04	6.30E-03		5.4E+00		6.0E+01		5.9E+05		2.4E+02		1.0E+00		1.8E+01		7.8E+05		1.0E+01	
VOC	Ethyl Benzene	100-41-4	D	4				6.50E-04	6.30E-03		1.4E+02		2.4E+03		1.3E+07		1.4E+02		8.7E+01		7.2E+02		1.0E+07		1.4E+02	
VOC	2-Hexanone	591-78-6		4				1.90E-03	2.50E-02		1.8E+03		1.3E+03		1.2E+06		2.5E+03		9.9E+02		1.1E+03		2.7E+06		2.5E+03	
VOC	Methyl Acetate	79-20-9		4				1.20E-03	1.30E-02																	
VOC	Methyl tert-butyl ether	1634-04-4		4				9.20E-04	2.50E-02		5.9E+03		3.0E+04		8.8E+07		5.9E+03		5.9E+03		2.5E+04		2.0E+08		1.5E+03	
VOC	4-Methyl-2-pentanone	108-10-1	ID	4				2.10E-03	2.50E-02		2.7E+03		5.3E+04		6.0E+07		2.7E+03		2.7E+03		4.5E+04		1.4E+08		2.7E+03	
VOC	Methylcyclohexane	108-87-2		4	1	1.10E-03	1.10E-03	1.20E-02	1.30E-02																	
VOC	Methylene Chloride	75-09-2	B2	4				1.40E-03	6.30E-03		2.4E+02		7.0E+02		8.3E+06		2.3E+03		4.5E+01		2.1E+02		6.6E+06		1.3E+03	
VOC	Styrene	100-42-5		4				5.50E-04	6.30E-03		5.2E+02		3.3E+03		6.9E+06		3.3E+02		2.5E+02		9.7E+02		5.5E+06		4.0E+02	
VOC	1,1,2,2-Tetrachloroethane	79-34-5	C	4				2.00E-03	6.30E-03		2.3E+01		3.4E+01		6.8E+04		2.4E+02		4.3E+00		1.0E+01		5.4E+04		5.3E+01	
VOC	Tetrachloroethene	127-18-4	C-B2	4				1.30E-03	6.30E-03		6.0E+01		6.0E+02		6.8E+06		8.8E+01		1.1E+01		1.8E+02		5.4E+06		8.8E+01	
VOC	Toluene	108-88-3	D	4	4	1.20E-03	5.00E-03				2.5E+02	2.0E-05	3.3E+03	1.5E-06	1.2E+07	4.2E-10	2.5E+02	2.0E-05	2.5E+02	2.0E-05	2.8E+03	1.8E-06	2.7E+07	1.9E-10	2.5E+02	2.0E-05
VOC	1,2,4-Trichlorobenzene	120-82-1	D	4				9.70E-04	6.30E-03		1.1E+03		3.4E+04		1.1E+07		1.1E+03		1.1E+03		2.8E+04		2.5E+07		9.9E+02	
VOC	1,1,1-Trichloroethane	71-55-6	D	4				1.00E-03	6.30E-03		4.6E+02		4.5E+03		2.9E+07		4.6E+02		2.5E+02		3.8E+03		6.7E+07		4.6E+02	
VOC	1,1,2-Trichloroethane	79-00-5	C	4				1.30E-03	6.30E-03		2.4E+01		5.7E+01		2.5E+05		8.4E+02		4.6E+00		1.7E+01		1.9E+05		1.8E+02	
VOC	Trichloroethene	79-01-6	C-B2	4				8.30E-04	6.30E-03		3.7E+01		2.6E+02		2.3E+06		5.0E+02		7.1E+00		7.8E+01		1.8E+06		5.0E+02	
VOC	Trichlorofluoromethane	75-69-4		4				1.20E-03	1.30E-02		5.6E+02		1.1E+05		1.7E+09		5.6E+02		5.6E+02		9.2E+04		3.8E+09		5.6E+02	
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		4				1.00E-03	6.30E-03		5.5E+02		2.1E+05		2.3E+09		5.5E+02		5.5E+02		1.8E+05		5.1E+09		5.5E+02	
VOC	Vinyl Chloride	75-01-4	A	4				1.50E-03	1.30E-02		2.8E+00		2.9E+01		8.9E+05		3.4E+01		2.7E-01		3.5E+05		3.8E+00		3.8E+00	
VOC	Xylenes (total)	1330-20-7	ID	4				2.10E-03	1.30E-02		1.5E+02		5.4E+04		1.3E+08		1.5E+02		1.5E+02		4.6E+04		2.9E+08		1.5E+02	
SVOC	Acenaphthene	83-32-9		4				1.60E-02	4.00E-01		3.5E+05		9.7E+04		6.2E+06		1.3E+05		1.9E+05		8.1E+04		1.4E+07		4.1E+04	
SVOC	Acenaphthylene	208-96-8	D	4				2.20E-02	4.00E-01		3.0E+03		2.7E+03		1.0E+06		5.2E+03		1.6E+03		2.2E+03		2.3E+06		1.6E+03	
SVOC	Acetophenone	98-86-2	D	4				2.40E-02	4.00E-01		1.1E+03		5.2E+04		1.4E+07		3.3E+03		1.1E+03		4.4E+04		3.3E+07		1.1E+03	
SVOC	Anthracene	120-12-7	D	4				2.00E-02	4.00E-01		1.0E+06		1.6E+06		2.9E+07		7.3E+05		1.0E+06		1.4E+06		6.7E+07		2.3E+05	
SVOC	Atrazine	1912-24-9		4				2.60E-02	4.00E-01								3.3E+02								7.1E+01	
SVOC	Benzaldehyde	100-52-7		4				1.60E-02	4.00E-01																	
SVOC	Benzo(a)anthracene	56-55-3	B2	4				2.70E-02	4.00E-01								8.0E+01								2.0E+01	
SVOC	Benzo(a)pyrene	50-32-8	B2	4				1.80E-02	4.00E-01						1.9E+03		8.0E+00					1.5E+03			2.0E+00	
SVOC	Benzo(b)fluoranthene	205-99-2	B2	4				2.40E-02	4.00E-01								8.0E+01								2.0E+01	

TABLE 4-4
GENERAL MOTORS CORPORATION
PONTIAC NORTH CAMPUS - PONTIAC, MICHIGAN

RCRA FACILITY INVESTIGATION

DATA SUMMARY FOR AOI F-08 (SOIL)

Chem Group	Chemical	CASRN	Carc Class	No of Analyses	No of Detects	Min Detected (mg/kg)	Max Detected (mg/kg)	Min QL (mg/kg)	Max QL (mg/kg)	Site Specific Background (mg/kg)	Industrial Soil Volatilization to Indoor Air Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Soil Volatilization to Indoor Air Inhalation Criteria	Industrial Infinite Source Volatile Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Infinite Source Volatile Soil Inhalation Criteria	Industrial Particulate Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Particulate Soil Inhalation Criteria	Industrial Direct Contact Criteria (mg/kg)	Ratio of Max Detect to Industrial Direct Contact Criteria	Residential Soil Volatilization to Indoor Air Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Soil Volatilization to Indoor Air Inhalation Criteria	Residential Infinite Source Volatile Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Infinite Source Volatile Soil Inhalation Criteria	Residential Particulate Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Particulate Soil Inhalation Criteria	Residential Direct Contact Criteria (mg/kg)	Ratio of Max Detect to Residential Direct Contact Criteria
SVOC	Dimethylphthalate	131-11-3	D	4				2.00E-02	4.00E-01						1.5E+06		7.9E+02						3.3E+06		7.9E+02	
SVOC	Di-n-butylphthalate	84-74-2	D	4				2.70E-02	4.00E-01						1.5E+06		7.6E+02						3.3E+06		7.6E+02	
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		4				5.60E-02	2.00E+00								2.6E+02								7.9E+01	
SVOC	2,4-Dinitrophenol	51-28-5		4				5.50E-02	2.00E+00																	
SVOC	2,4-Dinitrotoluene	121-14-2	B2	4				2.60E-02	4.00E-01						2.0E+04		2.2E+02						1.6E+04		4.8E+01	
SVOC	2,6-Dinitrotoluene	606-20-2	B2	4				1.80E-02	4.00E-01																	
SVOC	Di-n-octylphthalate	117-84-0		4				7.50E-02	4.00E-01								2.0E+04								6.9E+03	
SVOC	Fluoranthene	206-44-0	D	4				1.90E-02	4.00E-01		1.0E+06		8.9E+05		4.1E+06		1.3E+05		1.0E+06		7.4E+05		9.3E+06		4.6E+04	
SVOC	Fluorene	86-73-7	D	4				1.80E-02	4.00E-01		1.0E+06		1.5E+05		4.1E+06		8.7E+04		5.8E+05		1.3E+05		9.3E+06		2.7E+04	
SVOC	Hexachlorobenzene	118-74-1	B2	4				2.60E-02	4.00E-01			2.2E+02	5.6E+01		8.5E+03		3.7E+01		4.1E+01		1.7E+01		6.8E+03		8.9E+00	
SVOC	Hexachlorobutadiene	87-68-3	C	4				1.90E-02	4.00E-01			3.5E+02	4.6E+02		1.8E+05		4.6E+02		1.3E+02		1.3E+02		1.4E+05		1.0E+02	
SVOC	Hexachlorocyclopentadiene	77-47-4	E	4				1.20E-02	4.00E-01			5.6E+01	6.0E+01		5.9E+03		7.2E+02		3.0E+01		5.0E+01		1.3E+04		7.2E+02	
SVOC	Hexachloroethane	67-72-1	C	4				2.00E-02	1.20E-01		7.9E+01		6.6E+02		1.0E+05		7.3E+02		4.0E+01		5.5E+02		2.3E+05		2.3E+02	
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	4				2.20E-02	4.00E-01								8.0E+01								2.0E+01	
SVOC	Isophorone	78-59-1	C	4				2.60E-02	4.00E-01						8.2E+06		2.4E+03						1.2E+07		2.4E+03	
SVOC	2-Methylnaphthalene	91-57-6	ID	4				2.00E-02	4.00E-01								2.6E+04								8.1E+03	
SVOC	Methylphenol (total)	1319-77-3		4				2.50E-02	4.00E-01						2.9E+06		3.6E+04						6.7E+06		1.1E+04	
SVOC	Naphthalene	91-20-3	C	4				2.00E-02	4.00E-01		4.7E+02		3.5E+02		8.8E+04		5.2E+04		2.5E+02		3.0E+02		2.0E+05		1.6E+04	
SVOC	2-Nitroaniline	88-74-4		4				1.50E-02	2.00E+00																	
SVOC	3-Nitroaniline	99-09-2	C	4				2.60E-02	2.00E+00																	
SVOC	4-Nitroaniline	100-01-6	C	4				2.00E-02	2.00E+00																	
SVOC	Nitrobenzene	98-95-3	D	4				2.80E-02	4.00E-01		1.7E+02		6.4E+01		2.1E+04		3.4E+02		9.1E+01		5.4E+01		4.7E+04		1.0E+02	
SVOC	2-Nitrophenol	88-75-5		4				2.50E-02	4.00E-01								2.0E+03								6.3E+02	
SVOC	4-Nitrophenol	100-02-7		4				6.20E-02	2.00E+00																	
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	4				2.20E-02	4.00E-01								7.8E+03								1.7E+03	
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	4				1.80E-02	4.00E-01						2.0E+03		5.4E+00						1.6E+03		1.2E+00	
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	4				3.20E-02	4.00E-01																	
SVOC	Pentachlorophenol	87-86-5	B2	4				7.10E-02	4.10E+00						1.3E+05		3.2E+02						1.0E+05		9.0E+01	
SVOC	Phenanthrene	85-01-8	D	4				2.50E-02	4.00E-01		5.1E+03		1.9E+02		2.9E+03		5.2E+03		2.8E+03		1.6E+02		6.7E+03		1.6E+03	
SVOC	Phenol	108-95-2	ID	4	1	2.70E-01	2.70E-01	3.50E-01	4.00E-01						1.8E+07	1.5E-08	1.2E+04	2.3E-05					4.0E+07	6.8E-09	1.2E+04	2.3E-05
SVOC	Pyrene	129-00-0	D	4				2.50E-02	4.00E-01		1.0E+06		7.8E+05		2.9E+06		8.4E+04		1.0E+06		6.5E+05		6.7E+06		2.9E+04	
SVOC	2,4,5-Trichlorophenol	95-95-4		4				1.80E-02	4.00E-01						1.0E+07		7.3E+04						2.3E+07		2.3E+04	
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	4				2.20E-02	4.00E-01						1.3E+06		3.3E+03						1.0E+06		7.1E+02	
P/PCB	PCBs (total)	1336-36-3	B2	4				2.40E-02	4.00E-02		1.6E+04		8.1E+02		6.5E+03		1.6E+01		3.0E+03		2.4E+02		5.2E+03		4.0E+00	
INORG	Antimony	7440-36-0		4				1.35E-01	2.41E+00						5.9E+03		6.7E+02						1.3E+04		1.8E+02	
INORG	Arsenic	7440-38-2	A	4	4	2.22E+00	3.86E+00			1.3E+01					9.1E+02		3.7E+01						7.2E+02		7.6E+00	
INORG	Barium	7440-39-3	D	4	4	4.60E+00	1.35E+01			1.1E+02					1.5E+05		1.3E+05						3.3E+05		3.7E+04	
INORG	Beryllium	7440-41-7	B1	4	1	8.24E-02	8.24E-02	1.05E-01	1.20E-01	1.5E+00					5.9E+02		1.6E+03						1.3E+03		4.1E+02	
INORG	Cadmium	7440-43-9	B1	4	4	7.78E-02	2.61E-01			1.2E+00					2.2E+03		2.1E+03						1.7E+03		5.5E+02	
INORG	Chromium (total)	7440-47-3		4	4	3.86E+00	5.63E+00			4.9E+01					2.4E+02		9.2E+03						2.6E+02		2.5E+03	
INORG	Cobalt	7440-48-4	B1	4	4	1.83E+00	7.53E+00			1.7E+01					5.9E+03		9.0E+03						1.3E+04		2.6E+03	
INORG	Copper	7440-50-8	D	4	4	4.13E+00	1.52E+01			3.2E+01					5.9E+04		7.3E+04						1.3E+05		2.0E+04	
INORG	Lead	7439-92-1	B2	4	4	2.26E+00	4.95E+00			4.9E+01					4.4E+04		9.0E+02						1.0E+05		4.0E+02	
INORG	Manganese	7439-96-5	D	4	4	1.15E+02	3.22E+02			5.1E+02					1.5E+03		9.0E+04						3.3E+03		2.5E+04	
INORG	Mercury	7439-97-6	D	4	1	9.90E-03	9.90E-03	1.88E-02	3.97E-02	1.3E-01	8.9E+01		6.2E+01		8.8E+03		5.8E+02		4.8E+01		5.2E+01		2.0E+04		1.6E+02	
INORG	Nickel	7440-02-0	A	4	4	4.62E+00	9.03E+00			3.0E+01					1.6E+04		1.5E+05						1.3E+04		4.0E+04	
INORG	Selenium	7782-49-2	D	4				2.53E-01	6.02E-01	4.1E-01					5.9E+04		9.6E+03						1.3E+05		2.6E+03	
INORG	Silver	7440-22-4	D	4				5.88E-02	6.02E-01						2.9E+03		9.0E+03						6.7E+03		2.5E+03	
INORG	Thallium	7440-28-0		4	3	6.97E-01	9.43E-01	3.41E-01	3.41E-01								1.3E+02	7.3E-03							3.5E+01	2.7E-02
INORG	Vanadium	7440-62-2		4	4	4.84E+00	1.01E+01			3.3E+01							5.5E+03								7.5E+02	
INORG	Zinc	7440-66-6	D	4	4	1.54E+01	3.65E+01			1.9E+02							6.3E+05								1.7E+05	

Notes:
Screening Criteria is from Michigan DEQ Act 451, Part 201.
The Screening Criteria for Pyrene were used as surrogates for Phenanthrene and Benzo(g,h,i)perylene.
The Screening Criteria for Naphthalene were used as surrogates for 2-Methylnaphthalene.
The Screening Criteria for Chromium VI was used as a surrogate for Chromium (total).
The concentrations for the Methylphenol (2, 3, & 4) were summed before comparing to the Screening Criteria for 4-Methylphenol.
The concentrations for all PCB isomers were summed before comparing to the Screening Criteria.
The concentrations for the Xylene isomers (m/p and o) were summed before comparing to the Screening Criteria.
The concentrations for the 1,3-Dichloropropene isomers (cis and trans) were summed before comparing to the Screening Criteria.

Chem Group - Chemical Group
Carc Class - EPA Weight-of-Evidence Cancer Classification
Min QL - Minimum Quantitation Limit
Max QL - Maximum Quantitation Limit

TABLE 4-5
GENERAL MOTORS CORPORATION
PONTIAC NORTH CAMPUS - PONTIAC, MICHIGAN

RCRA FACILITY INVESTIGATION

DATA SUMMARY FOR AOI F-15 (SOIL)

Chem Group	Chemical	CASRN	Carc Class	No of Analyses	No of Detects	Min Detected (mg/kg)	Max Detected (mg/kg)	Min QL (mg/kg)	Max QL (mg/kg)	Site Specific Background (mg/kg)	Industrial Soil Volatilization to Indoor Air Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Soil Volatilization to Indoor Air Inhalation Criteria	Industrial Infinite Source Volatile Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Infinite Source Volatile Soil Inhalation Criteria	Industrial Particulate Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Particulate Soil Inhalation Criteria	Industrial Direct Contact Criteria (mg/kg)	Ratio of Max Detect to Industrial Direct Contact Criteria	Residential Soil Volatilization to Indoor Air Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Soil Volatilization to Indoor Air Inhalation Criteria	Residential Infinite Source Volatile Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Infinite Source Volatile Soil Inhalation Criteria	Residential Particulate Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Particulate Soil Inhalation Criteria	Residential Direct Contact Criteria (mg/kg)	Ratio of Max Detect to Residential Direct Contact Criteria
VOC	Acetone	67-64-1	ID	19	7	4.30E-03	5.70E-01	2.20E-02	1.10E+00		1.1E+05	5.2E-06	1.6E+05	3.6E-06	1.7E+08	3.4E-09	7.3E+04	7.8E-06	1.1E+05	5.2E-06	1.3E+05	4.4E-06	3.9E+08	1.5E-09	2.3E+04	2.5E-05
VOC	Benzene	71-43-2	A	19	3	8.60E-04	4.00E-02	3.20E-04	3.75E-01		8.4E+00	4.8E-03	4.5E+01	8.9E-04	4.7E+05	8.5E-08	4.0E+02	1.0E-04	1.6E+00	1.3E+01	3.8E+05	3.1E-03	3.8E+05	1.1E-07	1.8E+02	2.2E-04
VOC	Bromodichloromethane	75-27-4	B2	19				5.10E-04	3.75E-01		6.4E+00		3.1E+01		1.1E+05		4.9E+02		1.2E+00		9.1E+00		8.4E+04		1.1E+02	
VOC	Bromoform	75-25-2	B2	19				6.70E-04	3.75E-01		7.7E+02		3.1E+03		3.6E+06		8.7E+02		1.5E+02		9.0E+02		2.8E+06		8.2E+02	
VOC	Bromomethane	74-83-9	D	19				1.50E-03	7.50E-01		1.6E+00		1.3E+01		1.5E+05		1.0E+03		8.6E-01		1.1E+01		3.3E+05		3.2E+02	
VOC	2-Butanone	78-93-3	ID	19	5	2.20E-03	3.80E-01	1.40E-03	1.50E+00		2.7E+04	1.4E-05	3.5E+04	1.1E-05	2.9E+07	1.3E-08	2.7E+04	1.4E-05	2.7E+04	1.4E-05	2.9E+04	1.3E-05	6.7E+07	5.7E-09	2.7E+04	1.4E-05
VOC	Carbon Disulfide	75-15-0		19				2.60E-04	3.75E-01		1.4E+02		1.6E+03		2.1E+07		2.8E+02		7.6E+01		1.3E+03		4.7E+07		2.8E+02	
VOC	Carbon Tetrachloride	56-23-5	B2	16				4.60E-04	3.75E-01		9.9E-01		1.2E+01		1.7E+05		3.9E+02		1.9E-01		3.5E+00		1.3E+05		9.6E+01	
VOC	Chlorobenzene	108-90-7	D	19				3.70E-04	3.75E-01		2.2E+02		9.2E+02		2.1E+06		2.6E+02		1.2E+02		7.7E+02		4.7E+06		2.6E+02	
VOC	Chloroethane	75-00-3		19	6	6.30E-03	1.50E+00	8.80E-04	7.50E-01		9.5E+02	1.6E-03	3.6E+04	4.2E-05	2.9E+08	5.2E-09	9.5E+02	1.6E-03	9.5E+02	1.6E-03	3.0E+04	5.0E-05	6.7E+08	2.2E-09	9.5E+02	1.6E-03
VOC	Chloroform	67-66-3	B2	19				5.00E-04	3.75E-01		3.8E+01		1.5E+02		1.6E+06		1.5E+03		7.2E+00		4.5E+01		1.3E+06		1.2E+03	
VOC	Chloromethane	74-87-3	D	19				4.50E-04	7.50E-01		1.0E+01		1.2E+02		2.6E+06		1.1E+03		2.3E+00		4.0E+01		4.9E+06		1.1E+03	
VOC	Cumene	98-82-8	D	19				5.10E-04	3.75E-01		3.9E+02		2.0E+03		2.6E+06		3.9E+02		3.9E+02		1.7E+03		5.8E+06		3.9E+02	
VOC	Cyclohexane	110-82-7	ID	19	2	6.30E-02	1.10E-01	4.40E-04	7.50E-01																	
VOC	1,2-Dibromo-3-chloropropane	96-12-8	B2	19				1.10E-03	8.00E-01		1.2E+00		1.5E+01		5.9E+03		1.2E+00		1.2E+00		1.3E+01		1.3E+04		1.2E+00	
VOC	Dibromochloromethane	124-48-1	C	19				5.90E-04	3.75E-01		2.1E+01		8.0E+01		3.9E+05		2.4E+01		1.6E+05		2.4E+01		1.3E+05		1.1E+02	
VOC	1,2-Dibromoethane	106-93-4	B2	19				3.40E-04	3.75E-01		3.6E+00		5.8E+00		1.8E+04		4.3E-01		6.7E-01		1.7E+00		1.4E+04		2.5E-01	
VOC	1,2-Dichlorobenzene	95-50-1	D	19				4.20E-04	3.75E-01		2.1E+02		4.6E+04		4.4E+07		2.1E+02		2.1E+02		3.9E+04		1.0E+08		2.1E+02	
VOC	1,3-Dichlorobenzene	541-73-1	D	19				6.30E-04	3.75E-01								1.7E+02								1.7E+02	
VOC	1,4-Dichlorobenzene	106-46-7	C	19				4.50E-04	3.75E-01		1.0E+02		2.6E+02		5.7E+05		1.9E+03		1.9E+01		7.7E+01		4.5E+05		4.0E+02	
VOC	Dichlorodifluoromethane	75-71-8		19				8.30E-04	7.50E-01		1.7E+03		6.3E+04		1.5E+09		1.0E+03		9.0E+02		5.3E+04		3.3E+09		1.0E+03	
VOC	1,1-Dichloroethane	75-34-3	C	19	12	1.30E-02	6.50E+00	2.90E-04	2.70E-01		4.3E+02	1.5E-02	2.5E+03	2.6E-03	1.5E+07	4.3E-07	8.9E+02	7.3E-03	2.3E+02	2.8E-02	2.1E+03	3.1E-03	3.3E+07	2.0E-07	8.9E+02	7.3E-03
VOC	1,2-Dichloroethane	107-06-2	B2	19				4.10E-04	3.75E-01		1.1E+01		2.1E+01		1.5E+05		4.2E+02		2.1E+00		6.2E+00		1.2E+05		9.1E+01	
VOC	1,1-Dichloroethene	75-35-4	C	19	4	1.60E-02	2.20E+00	5.10E-04	2.70E-01		3.3E-01	6.7E+00	5.9E-01		7.8E+04	2.8E-05	5.7E+02	3.9E-03	6.2E-02	3.5E+01	1.1E+00	2.0E+00	6.2E+04	3.5E-05	2.0E+02	1.1E-02
VOC	cis-1,2-Dichloroethene	156-59-2	D	19				3.20E-04	3.75E-01		4.1E+01		2.1E+02		1.0E+06		6.4E+02		2.2E+01		1.8E+02		2.3E+06		6.4E+02	
VOC	trans-1,2-Dichloroethene	156-60-5		19				3.70E-04	3.75E-01		4.3E+01		3.3E+02		2.1E+06		1.4E+03		2.3E+01		2.8E+02		4.7E+06		1.4E+03	
VOC	1,2-Dichloropropane	78-87-5	B2	19				3.20E-04	3.75E-01		7.4E+00		3.0E+01		1.2E+05		5.5E+02		4.0E+00		2.5E+01		2.7E+05		1.4E+02	
VOC	1,3-Dichloropropene (total)	542-75-6	B2	19				4.80E-04	3.75E-01		5.4E+00		6.0E+01		5.9E+05		2.4E+02		1.0E+00		1.8E+01		7.8E+05		1.0E+01	
VOC	Ethyl Benzene	100-41-4	D	19	2	2.80E-02	2.00E-01	5.10E-04	3.75E-01		1.4E+02	1.4E-03	2.4E+03	8.3E-05	1.3E+07	1.5E-08	1.4E+02	1.4E-03	8.7E+01	2.3E-03	7.2E+02	2.8E-04	1.0E+07	2.0E-08	1.4E+02	1.4E-03
VOC	2-Hexanone	591-78-6		19				1.30E-03	1.50E+00		1.8E+03		1.3E+03		1.2E+06		2.5E+03		9.9E+02		1.1E+03		2.7E+06		2.5E+03	
VOC	Methyl Acetate	79-20-9		19	2	2.10E-01	2.70E-01	9.50E-04	7.50E-01																	
VOC	Methyl tert-butyl ether	1634-04-4		19				2.90E-04	1.50E+00		5.9E+03		3.0E+04		8.8E+07		5.9E+03		5.9E+03		2.5E+04		2.0E+08		1.5E+03	
VOC	4-Methyl-2-pentanone	108-10-1	ID	19				8.60E-04	1.50E+00		2.7E+03		3.5E+04		6.0E+07		5.3E+03		2.7E+03		4.5E+04		1.4E+08		2.7E+03	
VOC	Methylcyclohexane	108-87-2		19	2	1.50E-01	2.40E-01	4.40E-04	7.50E-01																	
VOC	Methylene Chloride	75-09-2	B2	18	6	2.00E-03	1.50E-01	1.10E-03	3.75E-01		2.4E+02	6.3E-04	7.0E+02	2.1E-04	8.3E+06	1.8E-08	2.3E+03	6.5E-05	4.5E+01	3.3E-03	2.1E+02	7.1E-04	6.6E+06	2.3E-08	1.3E+03	1.2E-04
VOC	Styrene	100-42-5		16				3.10E-04	3.75E-01		5.2E+02		3.3E+03		6.9E+06		5.2E+02		2.5E+02		9.7E+02		5.5E+06		4.0E+02	
VOC	1,1,2,2-Tetrachloroethane	79-34-5	C	19				4.00E-04	3.75E-01		2.3E+01		3.4E+01		6.8E+04		2.4E+02		4.3E+00		1.0E+01		5.4E+04		5.3E+01	
VOC	Tetrachloroethene	127-18-4	C-B2	19	11	1.70E-03	8.10E+01	5.00E-04	1.40E-02		6.0E+01	1.4E-01	6.8E+06	1.2E-05	6.8E+01	9.2E-01	1.1E+01	4.1E+01	1.1E+01	7.4E+00	1.8E+02	4.5E-01	5.4E+06	1.5E-05	8.8E+01	9.2E-01
VOC	Toluene	108-88-3	D	18	7	7.00E-04	1.80E-01	3.40E-04	3.75E-01		2.5E+02	7.2E-04	3.3E+03	5.5E-05	1.2E+07	1.5E-08	2.5E+02	7.2E-04	2.5E+02	7.2E-04	2.8E+03	6.4E-05	2.7E+07	6.7E-09	2.5E+02	7.2E-04
VOC	1,2,4-Trichlorobenzene	120-82-1	D	19				5.70E-04	3.75E-01		1.1E+03		3.4E+04		1.1E+07		1.1E+03		1.1E+03		2.8E+04		2.5E+07		9.9E+02	
VOC	1,1,1-Trichloroethane	71-55-6	D	19	7	4.30E-02	9.10E+01	4.00E-04	2.20E-01		4.6E+02	2.0E-01	4.5E+03	2.0E-02	2.9E+07	3.1E-06	4.6E+02	2.0E-01	2.5E+02	3.6E-01	3.8E+03	2.4E-02	6.7E+07	1.4E-06	4.6E+02	2.0E-01
VOC	1,1,2-Trichloroethane	79-00-5	C	19				3.40E-04	3.75E-01		2.4E+01		5.7E+01		2.5E+05		8.4E+02		4.6E+00		1.7E+01		1.9E+05		1.8E+02	
VOC	Trichloroethene	79-01-6	C-B2	19	7	2.30E-03	2.10E-01	6.10E-04	1.70E-01		3.7E+01	5.7E-03	2.6E+02	8.1E-04	2.3E+06	9.1E-08	5.0E+02	4.2E-04	7.1E+00	3.0E-02	7.8E+01	2.7E-03	1.8E+06	1.2E-07	5.0E+02	4.2E-04
VOC	Trichlorofluoromethane	75-69-4		19				3.70E-04	7.50E-01		5.6E+02		1.1E+05		1.7E+09		5.6E+02		5.6E+02		9.2E+04		3.8E+09		5.6E+02	
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1		19				8.00E-04	3.75E-01		5.5E+02		2.1E+05		2.3E+09		5.5E+02		5.5E+02		1.8E+05		5.1E+09		5.5E+02	
VOC	Vinyl Chloride	75-01-4	A	19	4	7.70E-03	1.10E-01	4.40E-04	7.50E-01		2.8E+00	3.9E-02	2.9E+01	3.8E-03	8.9E+05	1.2E-07	3.4E+01	3.2E-03	2.7E-01	4.1E-01	4.2E+00	2.6E-02	3.5E+05	3.1E-07	3.8E+00	2.9E-02
VOC	Xylenes (total)	1330-20-7	ID	19	4	3.20E-02	1.10E+00	1.20E-03	7.50E-01		1.5E+02	7.3E-03	5.4E+04	2.0E-05	1.3E+08	8.5E-09	1.5E+02	7.3E-03	1.5E+02	7.3E-03	4.6E+04	2.4E-05	2.9E+08	3.8E-09	1.5E+02	7.3E-03
SVOC	Acenaphthene	83-32-9		9	1	8.30E-02	8.30E-02	5.80E-02	3.90E-01		3.5E+05	2.4E-07	9.7E+04	8.6E-07	6.2E+06	1.3E-08	1.3E+05	6.4E-07	1.9E+05	4.4E-07	8.1E+04	1.0E-06	1.4E+07	5.9E-09	4.1E+04	2.0E-06
SVOC	Acenaphthylene	208-96-8	D	9				5.30E-02	3.90E-01		3.0E+03		2.7E+03		1.0E+06		5.2E+03		1.6E+03		2.2E+03		2.3E+06		1.6E+03	
SVOC	Acetophenone	98-86-2	D	9	1	1.80E-01	1.80E-01	5.70E-02	3.90E-01		1.1E+03	1.6E-04	5.2E+04	3.5E-06	1.4E											

TABLE 4-5
GENERAL MOTORS CORPORATION
PONTIAC NORTH CAMPUS - PONTIAC, MICHIGAN

RCRA FACILITY INVESTIGATION

DATA SUMMARY FOR AOI F-15 (SOIL)

Chem Group	Chemical	CASRN	Carc Class	No of Analyses	No of Detects	Min Detected (mg/kg)	Max Detected (mg/kg)	Min QL (mg/kg)	Max QL (mg/kg)	Site Specific Background (mg/kg)	Industrial Soil Volatilization to Indoor Air Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Soil Volatilization to Indoor Air Inhalation Criteria	Industrial Infinite Source Volatile Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Infinite Source Volatile Soil Inhalation Criteria	Industrial Particulate Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Industrial Particulate Soil Inhalation Criteria	Industrial Direct Contact Criteria (mg/kg)	Ratio of Max Detect to Industrial Direct Contact Criteria	Residential Soil Volatilization to Indoor Air Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Soil Volatilization to Indoor Air Inhalation Criteria	Residential Infinite Source Volatile Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Infinite Source Volatile Soil Inhalation Criteria	Residential Particulate Soil Inhalation Criteria (mg/kg)	Ratio of Max Detect to Residential Particulate Soil Inhalation Criteria	Residential Direct Contact Criteria (mg/kg)	Ratio of Max Detect to Residential Direct Contact Criteria	
SVOC	Di-n-butylphthalate	84-74-2	D	9				1.70E-01	3.90E-01						1.5E+06		7.6E+02							3.3E+06		7.6E+02	
SVOC	4,6-Dinitro-2-methylphenol	534-52-1		9				1.80E-01	2.00E+00								2.6E+02								7.9E+01		
SVOC	2,4-Dinitrophenol	51-28-5		9				1.30E-01	2.00E+00																		
SVOC	2,4-Dinitrotoluene	121-14-2	B2	9				5.20E-02	3.90E-01						2.0E+04		2.2E+02						1.6E+04		4.8E+01		
SVOC	2,6-Dinitrotoluene	606-20-2	B2	9				5.50E-02	3.90E-01																		
SVOC	Di-n-octylphthalate	117-84-0		9				6.10E-02	3.90E-01								2.0E+04								6.9E+03		
SVOC	Fluoranthene	206-44-0	D	9	1	4.40E-01	4.40E-01	6.40E-02	3.90E-01		1.0E+06	4.4E-07	8.9E+05	4.9E-07	4.1E+06	1.1E-07	1.3E+05	3.4E-06	1.0E+06	4.4E-07	7.4E+05	5.9E-07	9.3E+06	4.7E-08	4.6E+04	9.6E-06	
SVOC	Fluorene	86-73-7	D	9	1	8.20E-02	8.20E-02	5.50E-02	3.90E-01		1.0E+06	8.2E-08	1.5E+05	5.5E-07	4.1E+06	2.0E-08	8.7E+04	9.4E-07	5.8E+05	1.4E-07	1.3E+05	6.3E-07	9.3E+06	8.8E-09	2.7E+04	3.0E-06	
SVOC	Hexachlorobenzene	118-74-1	B2	9				6.40E-02	3.90E-01		2.2E+02		5.6E+01		8.5E+03		3.7E+01		4.1E+01		1.7E+01		6.8E+03		8.9E+00		
SVOC	Hexachlorobutadiene	87-68-3	C	9				5.10E-02	3.90E-01		3.5E+02		4.6E+02		1.8E+05		3.5E+02		1.3E+02		1.3E+02		1.4E+05		1.0E+02		
SVOC	Hexachlorocyclopentadiene	77-47-4	E	9				6.80E-02	3.90E-01		5.6E+01		6.0E+01		5.9E+03		7.2E+02		3.0E+01		5.0E+01		1.3E+04		7.2E+02		
SVOC	Hexachloroethane	67-72-1	C	9				5.50E-02	1.20E-01		7.9E+01		6.6E+02		1.0E+05		7.3E+02		4.0E+01		5.5E+02		2.3E+05		2.3E+02		
SVOC	Indeno(1,2,3-cd)pyrene	193-39-5	B2	9				8.00E-02	3.90E-01								8.0E+01								2.0E+01		
SVOC	Isophorone	78-59-1	C	9				5.00E-02	3.90E-01						8.2E+06		2.4E+03						1.2E+07		2.4E+03		
SVOC	2-Methylnaphthalene	91-57-6	ID	9	2	1.80E-01	1.10E+00	5.50E-02	3.80E-01								2.6E+04	4.2E-05						8.1E+03	1.4E-04		
SVOC	Methylphenol (total)	1319-77-3		9	1	2.60E-01	2.60E-01	5.30E-02	3.90E-01						2.9E+06	9.0E-08	3.6E+04	7.2E-06					6.7E+06	3.9E-08	1.1E+04	2.4E-05	
SVOC	Naphthalene	91-20-3	C	9	4	1.20E-01	6.30E-01	5.60E-02	3.70E-01		4.7E+02	1.3E-03	3.5E+02	1.8E-03	8.8E+04	7.2E-06	5.2E+04	1.2E-05	2.5E+02	2.5E-03	3.0E+02	2.1E-03	2.0E+05	3.2E-06	1.6E+04	3.9E-05	
SVOC	2-Nitroaniline	88-74-4		9				5.20E-02	2.00E+00																		
SVOC	3-Nitroaniline	99-09-2	C	9				1.60E-01	2.00E+00																		
SVOC	4-Nitroaniline	100-01-6	C	9				7.70E-02	2.00E+00																		
SVOC	Nitrobenzene	98-95-3	D	9				5.20E-02	3.90E-01		1.7E+02		6.4E+01		2.1E+04		3.4E+02		9.1E+01		5.4E+01		4.7E+04		1.0E+02		
SVOC	2-Nitrophenol	88-75-5		9				5.20E-02	3.90E-01								2.0E+03								6.3E+02		
SVOC	4-Nitrophenol	100-02-7		9				2.20E-01	2.00E+00																		
SVOC	N-Nitrosodiphenylamine	86-30-6	B2	9				5.60E-02	3.90E-01								7.8E+03								1.7E+03		
SVOC	N-Nitroso-di-n-propylamine	621-64-7	B2	9				5.00E-02	3.90E-01						2.0E+03		5.4E+00						1.6E+03		1.2E+00		
SVOC	2,2'-oxybis(1-Chloropropane)	108-60-1	C	9				5.90E-02	3.90E-01																		
SVOC	Pentachlorophenol	87-86-5	B2	9				1.40E-01	4.10E+00						1.3E+05		3.2E+02						1.0E+05		9.0E+01		
SVOC	Phenanthrene	85-01-8	D	9	1	9.50E-01	9.50E-01	5.90E-02	3.90E-01		5.1E+03	1.9E-04	1.9E+02	5.0E-03	2.9E+03	3.3E-04	5.2E+03	1.8E-04	2.8E+03	3.4E-04	1.6E+02	5.9E-03	6.7E+03	1.4E-04	1.6E+03	5.9E-04	
SVOC	Phenol	108-95-2	ID	9	1	4.50E-01	4.50E-01	5.60E-02	3.90E-01						1.8E+07	2.5E-08	1.2E+04	3.8E-05					4.0E+07	1.1E-08	1.2E+04	3.8E-05	
SVOC	Pyrene	129-00-0	D	9	1	2.30E-01	2.30E-01	5.80E-02	3.90E-01		1.0E+06	2.3E-07	7.8E+05	2.9E-07	2.9E+06	7.9E-08	8.4E+04	2.7E-06	1.0E+06	2.3E-07	6.5E+05	3.5E-07	6.7E+06	3.4E-08	2.9E+04	7.9E-06	
SVOC	2,4,5-Trichlorophenol	95-95-4		9				6.30E-02	3.90E-01						1.0E+07		7.3E+04						2.3E+07		2.3E+04		
SVOC	2,4,6-Trichlorophenol	88-06-2	B2	9				7.20E-02	3.90E-01						1.3E+06		3.3E+03						1.0E+06		7.1E+02		
P/PCB	PCBs (total)	1336-36-3	B2	9	1	9.60E-02	9.60E-02	2.30E-02	1.90E-01		1.6E+04	6.0E-06	8.1E+02	1.2E-04	6.5E+03	1.5E-05	1.6E+01	6.0E-03	3.0E+03	3.2E-05	2.4E+02	4.0E-04	5.2E+03	1.8E-05	4.0E+00	2.4E-02	
INORG	Antimony	7440-36-0		9	1	3.13E-01	3.13E-01	2.80E-01	2.39E+00						5.9E+03	5.3E-05	6.7E+02	4.7E-04					1.3E+04	2.4E-05	1.8E+02	1.7E-03	
INORG	Arsenic	7440-38-2	A	9	9	1.87E+00	2.93E+01			1.3E+01					9.1E+02	1.8E-02	3.7E+01	4.4E-01					7.2E+02	2.2E-02	7.6E+00	2.1E+00	
INORG	Barium	7440-39-3	D	9	9	6.66E+00	6.00E+01			1.1E+02					1.5E+05		1.3E+05						3.3E+05		3.7E+04		
INORG	Beryllium	7440-41-7	B1	9	9	1.12E-01	4.34E-01			1.5E+00					5.9E+02		1.6E+03						1.3E+03		4.1E+02		
INORG	Cadmium	7440-43-9	B1	9	9	3.55E-02	1.35E+00			1.2E+00					2.2E+03	6.8E-05	2.1E+03	7.1E-05					1.7E+03	8.8E-05	5.5E+02	2.7E-04	
INORG	Chromium (total)	7440-47-3		9	9	3.51E+00	1.56E+01			4.9E+01					2.4E+02		9.2E+03						2.6E+02		2.5E+03		
INORG	Cobalt	7440-48-4	B1	9	9	1.87E+00	7.64E+00			1.7E+01					5.9E+03		9.0E+03						1.3E+04		2.6E+03		
INORG	Copper	7440-50-8	D	9	9	7.84E+00	6.50E+01			3.2E+01					5.9E+04	5.6E-04	7.3E+04	4.5E-04					1.3E+05	2.5E-04	2.0E+04	1.7E-03	
INORG	Lead	7439-92-1	B2	9	9	3.67E+00	3.01E+01			4.9E+01					4.4E+04		9.0E+02						1.0E+05		4.0E+02		
INORG	Manganese	7439-96-5	D	9	9	4.40E+01	5.82E+02			5.1E+02					1.5E+03	4.8E-02	9.0E+04	8.0E-04					3.3E+03	2.2E-02	2.5E+04	2.9E-03	
INORG	Mercury	7439-97-6	D	9	6	2.57E-02	3.92E-02	1.01E-02	3.94E-02		8.9E+01		6.2E+01		8.8E+03		5.8E+02		4.8E+01		5.2E+01		2.0E+04		1.6E+02		
INORG	Nickel	7440-02-0	A	9	9	5.38E+00	1.81E+01			3.0E+01					1.6E+04		1.5E+05						1.3E+04		4.0E+04		
INORG	Selenium	7782-49-2	D	9	1	3.72E+00	3.72E+00	1.76E-01	5.77E-01	4.1E-01					5.9E+04	5.6E-05	9.6E+03	3.4E-04					1.3E+05	2.5E-05	2.6E+03	1.3E-03	
INORG	Silver	7440-22-4	D	9				8.53E-02	5.97E-01						2.9E+03		9.0E+03						6.7E+03		2.5E+03		
INORG	Thallium	7440-28-0		9	3	5.47E-01	9.01E-01	2.99E-01	1.19E+00								1.3E+02	6.9E-03							3.5E+01	2.6E-02	
INORG	Vanadium	7440-62-2		9	9	6.49E+00	2.02E+01			3.3E+01							5.5E+03								7.5E+02		
INORG	Zinc	7440-66-6	D	9	9	2.45E+01	8.04E+01			1.9E+02							6.3E+05								1.7E+05		

Notes:

Screening Criteria is from Michigan DEQ Act 451, Part 201.

The Screening Criteria for Pyrene were used as surrogates for Phenanthrene and Benzo(g,h,i)perylene.

The Screening Criteria for Naphthalene were used as surrogates for 2-Methylnaphthalene.

The Screening Criteria for Chromium VI was used as a surrogate for Chromium (total).

The concentrations for the Methylphenol (2, 3, & 4) were summed before comparing to the Screening Criteria for 4-Methylphenol.

The concentrations for all PCB isomers were summed before comparing to the Screening Criteria.

The concentrations for the Xylene isomers (m/p and o) were summed before comparing to the Screening Criteria.

The concentrations for the 1,3-Dichloropropene isomers (cis and trans) were summed before comparing to the Screening Criteria.

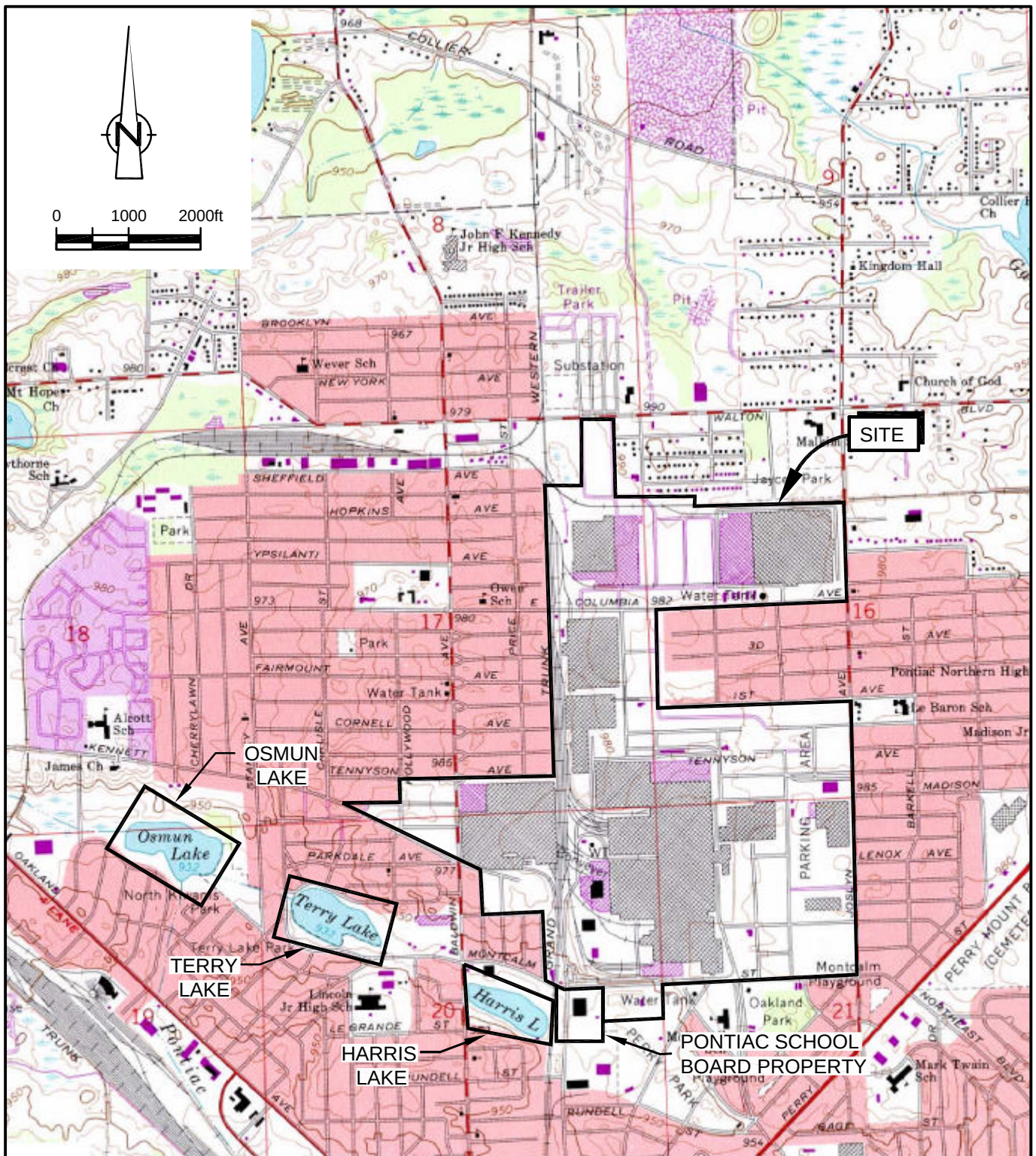
Chem Group - Chemical Group

Carc Class - EPA Weight-of-Evidence Cancer Classification

Min QL - Minimum Quantitation Limit

Max QL - Maximum Quantitation Limit

Figures



SOURCE: USGS QUADRANGLE MAP;
PONTIAC NORTH, MICHIGAN



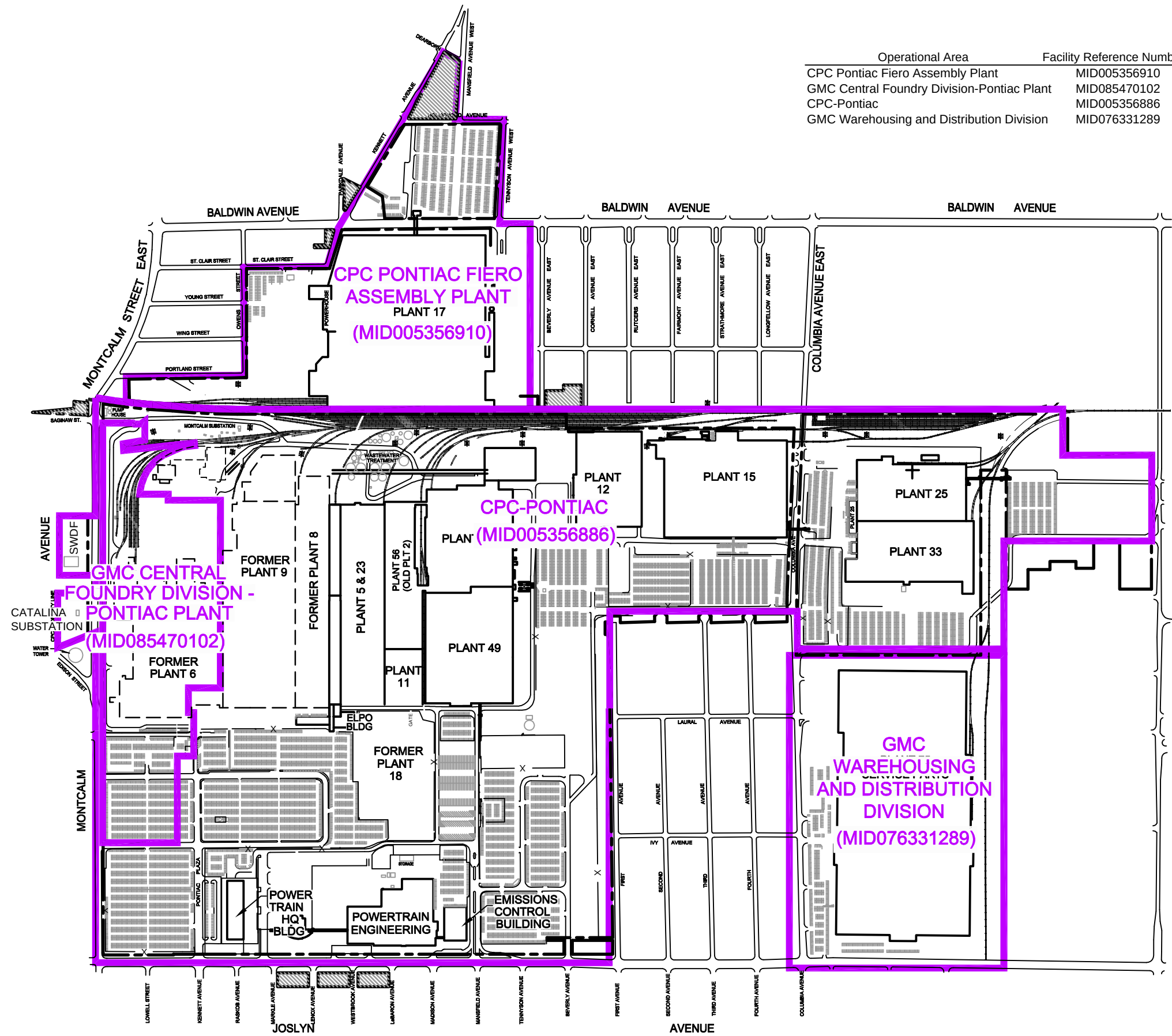
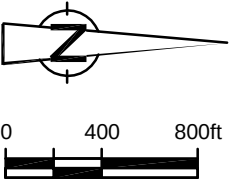
GENERAL MOTORS
PONTIAC, MICHIGAN
PONTIAC NORTH CAMPUS RFI

SITE LOCATION



FIGURE
1-1

Operational Area	Facility Reference Number
CPC Pontiac Fiero Assembly Plant	MID005356910
GMC Central Foundry Division-Pontiac Plant	MID085470102
CPC-Pontiac	MID005356886
GMC Warehousing and Distribution Division	MID076331289



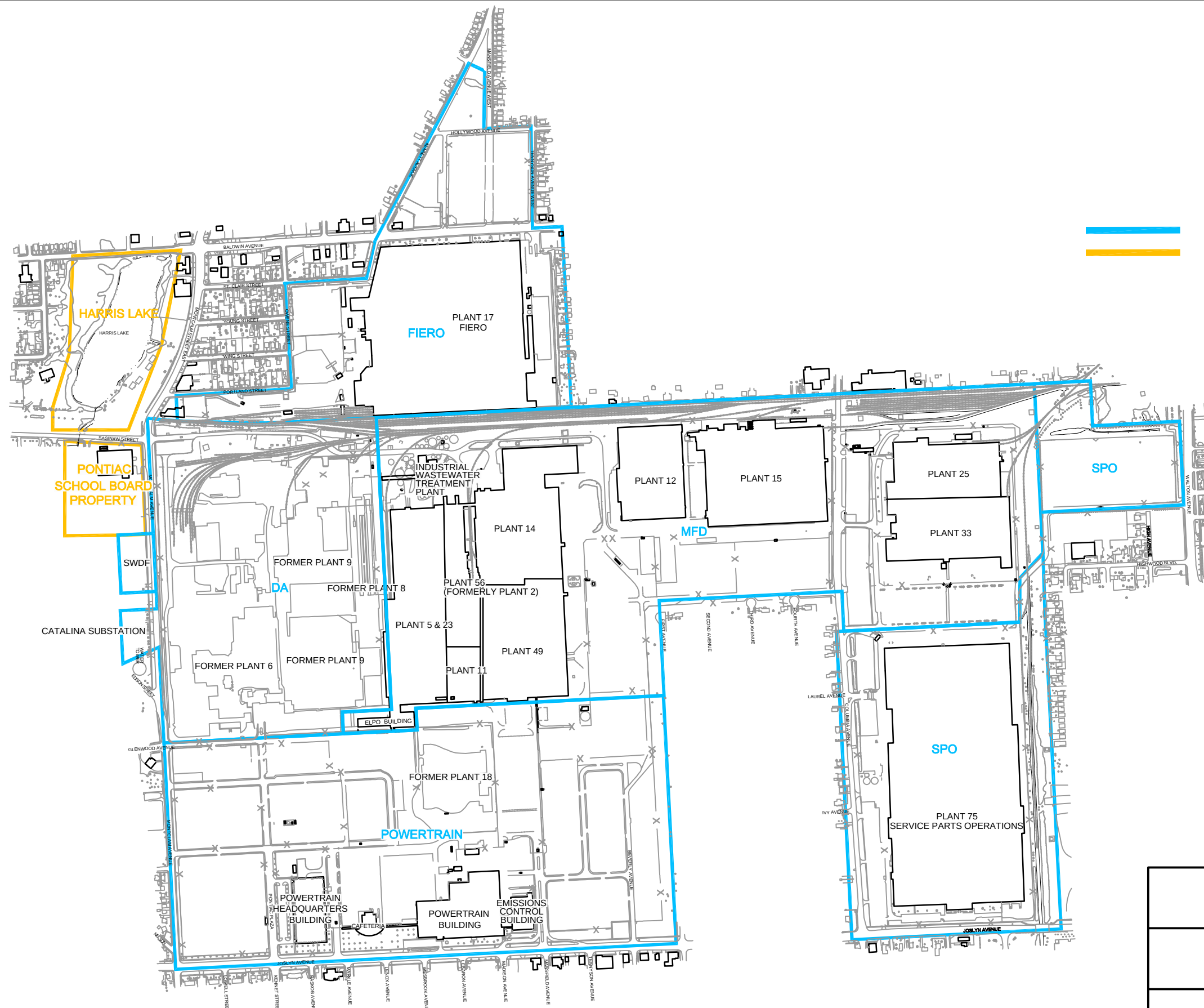
- LEGEND**
- PROPERTY BOUNDARY
 - RAILROAD TRACKS
 - FENCE
 - FACILITY BOUNDARY
 - FOOTPRINT OF FORMER STRUCTURE

GENERAL MOTORS
PONTIAC, MICHIGAN
PONTIAC NORTH CAMPUS RFI

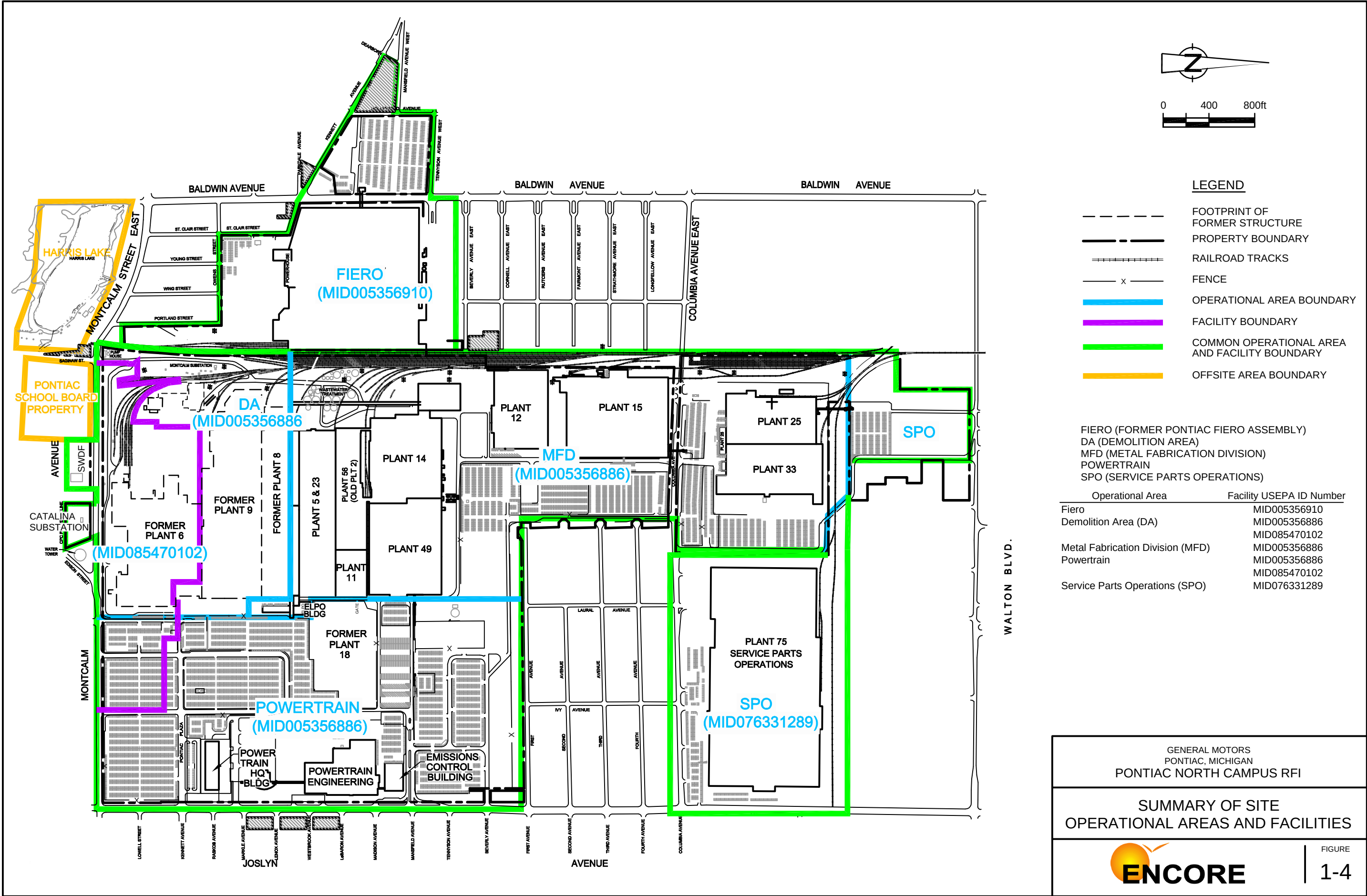
SITE FACILITIES

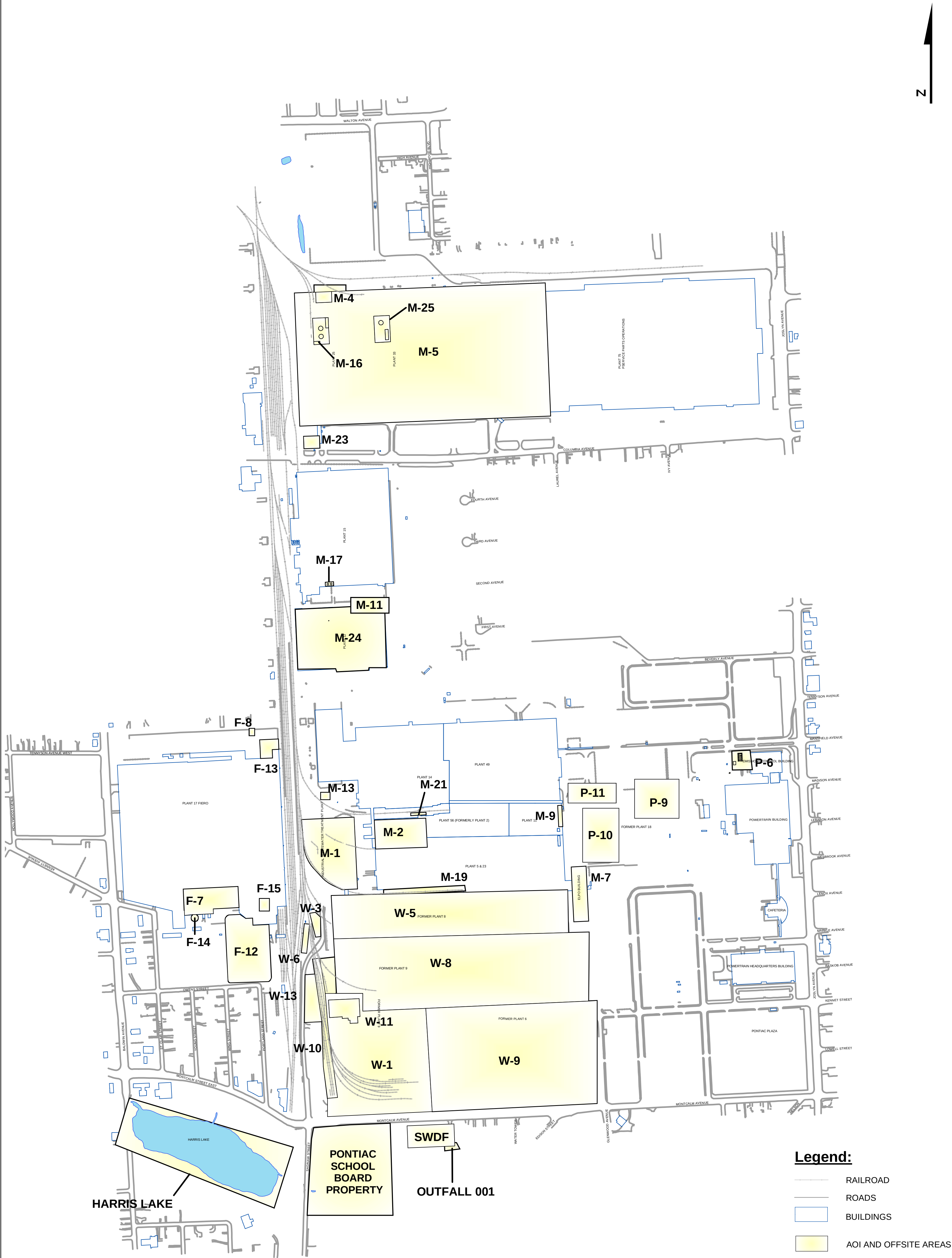


FIGURE
1-2



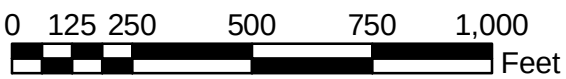
GENERAL MOTORS PONTIAC, MICHIGAN PONTIAC NORTH CAMPUS RFI	
SITE OPERATIONAL AREAS AND OFFSITE AREAS	
	FIGURE 1-3





Legend:

- RAILROAD
- ROADS
- BUILDINGS
- AOI AND OFFSITE AREAS
- W- 9** AOI ID



GENERAL MOTORS
PONTIAC, MICHIGAN
PONTIAC NORTH CAMPUS RFI

AREAS OF INTEREST AND OFFSITE AREAS



